

DE1052 Class/Sh7(2-2618-W)

6-15-66-1549
June 15, 1966

From: Todd Shipyards Corp.
(Seattle Division)
By Gibbs & Cox, Inc.
21 West Street
New York, N.Y. 10006

To: Buffalo Pumps, Inc.
North Tonawanda, New York

Subject: DE1052 - Distiller Feed Pump Purchase Specification
No. DE1052-517-M4710 Todd Purchase Order DES 2033
Preliminary Equipment Manual

References:

- (a) Letter from Buffalo Pumps, Inc. to Gibbs & Cox, Inc.
(3-18-66-64) dated March 15, 1966
- (b) Buffalo Pumps, Inc. Technical Manual for Distiller
Feed Pump DE1052 Class Ships

1. The Design Agent has reviewed Reference (b) as per Reference
(a) and considers it satisfactory subject to the following comments:

(a) Cover

(1) Change "Technical Manual" to "Equipment Manual".

(b) Title Page

(1) As noted in paragraph 1a1.

(c) Approval and Procurement Record Page

(1) Add "Page" after "Record".

(2) Delete "Basic" and add "For" after "Data".

(3) Comment 1a1 herein applies.

(4) Delete "Approved By" and insert "Approval Authority".

(5) Insert "Purchase" between "Or" and "Order".

Mailed copy to A. Bloom 6/17

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

DE1052 Class/SL7(2-2618-N)

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1. (c) (Cont'd)

- (6) Delete "Date" column.
- (7) Replace "Vessels" with "Ships".
- (8) Add "Quantity of Equipment" column between "Quantity of Manuals" and "Building Yard".
- (9) Change "Quantity of Manuals" from "86" to "74".
- (10) Delete all references to equipment used on ships built at Todd Shipyards Inc., San Pedro, California: i.e.; DE-1055, DE-1058, DE-1060, DE-1067, DE-1071, DE-1074 and DE-1076. Gibbs & Cox is the Approval Authority only for ships built at Todd Shipyards Inc., Seattle. Approval for equipment used on ships other than those built at Todd, Seattle, must be granted by the cognizant Naval authority.

(d) List of Effective Pages

- (1) Delete "Effective Pages" upper left corner.
- (2) Delete "Front Matter" upper right corner.

(e) Table of Contents

- (1) Delete "Contents" upper left hand corner.
- (2) Comment 1d2 herein applies.

(f) List of Illustrations

- (1) Delete "List of Illustrations" in the upper left corner.
- (2) Comment 1d2 herein applies.

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1. (g) Page vi1

(1) Delete "Frontispiece".

(h) Page 1-1-2

(1) Add "Prelubed" after "Ball"

(2) Change "length" from 2'-7-7/8" to 31-7/8"

(i) Page 1-3-1

(1) Delete item 3. "Lubrication of Motor" since the bearings are prelubricated and sealed and require no lubrication.

2. In addition to the above comments the manufacturer will be required to include an electrical section covering the motor. This section will be furnished by the motor manufacturer. The Table of Contents should include the motor section.

3. By separate correspondence, to the Supervisor, the Design Agent is requesting that a NAVSHIPS No. be assigned to this manual.

4. It is requested that the pump manufacturer resubmit the subject Equipment Manual, including the electrical section, for review by the Design Agent by July 5, 1966.

TODD SHIPYARDS CORPORATION
(SEATTLE DIVISION)
BY GIBBS & COX, INC.
W. C. BACHMAN



R. P. FULTON
By direction

EI/al

cc: SupShip, N.Y.
Todd, Seattle
Todd, N.Y.

DE1052 Class/SL7(2-3376-N)

7-28-66-1587
July 28, 1966

From: Todd Shipyards Corp.
(Seattle Division)
By Gibbs & Cox, Inc.
21 West Street,
New York, N.Y. 10006

To: Buffalo Pumps,
North Tonawanda, N.Y. 14121

Subject: DE1052 Class - Distiller Feed Pump -
Purchase Specification DE1052-S17-M4710
P.O. DES-2033 - Equipment Manual, Review of

References:

- (a) Letter from Buffalo Pumps Inc. to Gibbs & Cox, Inc. dated June 30, 1966 (7-1-66-66).
- (b) Buffalo Pumps Inc. Equipment Manual for Distiller Feed Pump for DE1052 Class Vessels.

1. Reference (b) forwarded by Reference (a) has been reviewed by the Design Agent and is considered satisfactory subject to the following comments:

- (a) On the cover and title page delete "Bureau of Ships" and in its place insert: "Naval Ship Engineering Center, Washington, D.C."
- (b) Page 1-1-1 under "Pump"
 - (1) After "Actual Shut off Head" insert actual data.
 - (2) Delete "structure borne noise Group C".
- (c) Page 1-1-2 under "Overall dimensions of assembled unit" height should be "22-1/8".
- (d) Page 1-1-4 - Paragraph 1-1-3 add "and Resilient Mounts" following "Mounting Subbase". In second sentence after "....foundation" add "to reduce sound transmission".
- (e) Page 1-2-1 - In the first sentence under Piping delete "all" and substitute "Normally all rigid...." Before the fourth sentence add, "However since this pump is resiliently mounted, flexible hoses are to be installed to reduce sound transmission and will also prevent piping stresses on the pump."

Copy sent to A. Bloom Bud 8/1/66

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DELO52 Class/SH7(2-3376-N)

1. (Cont'd)

(f) Page 1-3-1, Paragraph 1-3-1

(1) Under "Warning" add the following "Never use water on electrical fires. Use CO₂." Also add "When servicing pump, disconnect from sources of electrical power and tag."

(2) After "Pump priming", add "Insure that pump is completely filled with liquid."

(g) Page 1-3-1 Paragraph 1-3-2 the step 2 after "primed" add "and vented. Then close vent valve."

(h) Page 1-3-2 Paragraph 1-3-5 under "Vibration", in the second paragraph delete "to acceptable limits" and specify these limits. Also identify the locations for taking readings.

(i) Page 1-4-1, Paragraph 1-4-2 in the first sentence under "Trouble Shooting" delete "Listed below are" and substitute "Table- - - lists" at end of sentence add "and remedies".

(j) Page 1-4-2 - Delete paragraph number 1 to 5 and substitute table in the form "Trouble, Probable Cause, Remedy" including:

(1) For "No Discharge", Probable Cause should include Pump not primed, Speed too low, Impeller completely plugged, Plugged suction line or strainer, Pump not running and Impeller locked. Also indicate corresponding remedies.

(2) For "Insufficient Discharge", Probable Cause should include Air leaks in suction or stuffing box, Speed too low, Clogged suction line screen or impeller, Mechanical defects: Wearing rings worn; Impeller damaged. Also indicate corresponding remedies.

(3) For Insufficient Discharge Pressure, Probable Cause should include Speed too Low, Air or gases in liquid, Wrong direction of rotation, Mechanical Defects: Wearing rings worn; Impeller damaged. Also indicate corresponding remedies. For Air or gases in liquid, remedy is "Check suction for leaks. Vent frequently."

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DE1052 Class/Sl47(2-3376-N)

1. (j) (Cont'd)

- (4) For "Loss of Suction," Probable Cause should include Air or gases in liquid, Defective Casing Gasket. Also indicate corresponding remedies.
 - (5) For "Excessive Power Consumption", Probable Cause should include Speed too high, Mechanical Defects: Shaft bent, Rotating element binds. Also indicate corresponding remedies.
 - (6) Add Trouble "Stuffing box overheats or excessive stuffing box leakage". Probable Cause should include Insufficient cooling water to stuffing box, Excessively worn packing, Lantern ring installed between wrong packing rings, Excessive pressure in stuffing box, Seal cage plugged. Also indicate corresponding remedies.
 - (7) Add Trouble "Noisy Installation or Excessive Vibration". Probable Cause should include Loose mounting bolts, Mechanical defects, Impeller or motor imbalanced, Air or gases in liquid, Foreign matter in pump, Misalignment. Also indicate corresponding remedies.
- (k) Page 1-4-4 Following paragraph 2 under "Wearing Rings", add the following: "Resilient Mounts - make regular checks on resilient mounts. A normal service life of 5 years is expected unless damage or prior loss of effectiveness require earlier replacement. Resilient mounts should be replaced at such time when their performance is deemed ineffective or as specified by current BuShips instructions".

2. By separate correspondence to the Navy, the Design Agent has requested the assignment of a NAVSHIPS number.

3. The manual shall include an Electrical Section. This approved section will be forwarded by the motor manufacturer for insertion by the pump manufacturer.

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DE1052 Class/S47(2-3376-N)

4. It is requested that the pump manufacturer's acceptance of the above comments be forwarded to the Design Agent by August 15, 1966. Resubmittal is not required.

TODD SHIPYARD CORPORATION
(SEATTLE DIVISION)
BY GIBBS & COX, INC.
W. C. BACHMAN



R. P. Fulton
By direction

RH/jo

cc: SupShip, N.Y.
Todd, Seattle
Todd, New York

Copy to Art Bloom
3/15/68
RME

file 570

3-6-68-1596

DE1052 Class/SS8(2-6207-N)

March 5, 1968

From: Todd Shipyards Corporation
(Seattle Division)
By Gibbs & Cox, Inc.
21 West Street
New York, New York 10006

To: Aqua-Chem, Inc.
225 North Grand Ave.
Waukesha, Wisconsin 53186
Attn: Mr. R. E. Ruttner

Subject: DE1052 Class - Distilling Plant - Distiller Distillate
Pump & Distiller Sea Water Heater
Drain Pump - Purchase Specification
No. DE1052-517-M5800 - P.O. DES 2016
Preliminary Technical Manual - Approval of

References:

- (a) Letter from Aqua-Chem, Inc. to Gibbs & Cox, Inc., dated 9 November 1966 (11-14-66-120)
- (b) Preliminary Technical Manual for Distiller Distillate Pump & Distiller Sea Water Heater Drain Pump
- (c) Preliminary Technical Manual for Aqua-Chem, Inc. 12,000 GPD Flash Type Distilling Plant (Model S500FL2H)
- (d) Military Specification MIL-M-15071E(Ships)

1. Reference (b), forwarded via Reference (a), has been examined in conjunction with Reference (d) and the subject purchase order specifications. In this regard, Reference (b) is considered satisfactory for publication and distribution, subject to the manufacturer's compliance with the following comments:

(a) Cover Layout

- (1) Delete "Bureau of Ships" and insert "Naval Ship Systems Command".
- (2) Insert the appropriate NAVSHIPS Number, when available.

(b) Title Page

- (1) Comments 1.a.1 and 1.a.2 apply herein.

DE1052 Class/S58(2-6207-N)

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1. (Cont'd)

(c) Approval and Procurement Record Page

- (1) The appropriate NAVSHIPS Number should be added under the Approval Data and the Certification Data columns.
- (2) The approval authority should be delineated as follows:
 "Approved by Todd Shipyards Corp. (Seattle Division)
 (G&C) letter DE1052 Class/S58(2-6207-N), dated
 March 5, 1968

(d) Table of Contents & List of Illustrations

- (1) It is noted that the manual does not contain the appropriate motor and controller inserts for each pump. Accordingly, the approved inserts should be added, when available. Additionally, the Table of Contents should be revised to indicate a separate chapter for each pump, motor and controller.
- (2) Pursuant to comment 1.d.1, it is recommended that each chapter of the manual be divided by an appropriate separator.
- (3) On Page 1-i, insert Section 7, entitled Motor and Controller, and add the appropriate page number.
- (4) In line with comment 1.d.1, the motor and controller drawings should be included as illustrations. The appropriate page numbers should be indicated on Page 1-ii.

(e) Section 1 - General Data (Distiller Distillate Pump)

- (1) On Page 1-1-1 add the phrase "At Rating" in conjunction with the 1.09 BHP.
- (2) The Military Specification for the motor should be changed to MIL-M-17060B. Additionally, the Design Agent notes that this information is also in error on Figure No. 1-6-1.

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1. (e) (Cont'd)

(3) It is noted that the weights for the subject equipment, shown on Page 1-1-2, are calculated weights. This information should be reflected therein.

(4) On Page 1-1-2, under Reference Drawings, the manual should list the appropriate number for reference..

(f) Section 1 - Detailed Description

(1) Under the paragraph on the casing, Page 1-1-3, make the following changes:

(a) Delete the word "Spigot" in the second sentence, and insert the word "Stepped".

(b) In the fourth sentence, identify the drain plug as Pc. No. (34), the vent cock as Pc. No. (26), and the flanged seal water connection as Pc. No. (41).

(2) Revise the last sentence of the paragraph on the motor bracket to read as follows:

"The motor bracket contains drain fittings which may be used to remove leakage from the stuffing box".

(g) Section 3 - Operating Instructions

(1) Inasmuch as the motor, utilized for this installation, is equipped with sealed bearings, any reference to motor lubrication is inappropriate. Therefore, Item 3 under Section 1-3-1 should be deleted.

(h) Section 4 - Maintenance

(1) The second sentence of Item 2 under Annual Maintenance Procedure, Page 1-4-1, should be revised as follows:

"When clearance has increased to double the initial value, the original clearance, as shown on Page 1-1-2, should be restored by replacing the affected parts".

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1. (h) (Cont'd)

(2) The Trouble Shooting Table, on Pages 1-4-2 to 1-4-5, should be modified to accommodate the following:

- (a) Under "Noisy Installation", delete the Cause and Remedy for "Specific Gravity of the Liquid Too High". Revise the remedy for "Speed Too High" to read as follows: "Check the Driver for High Speed, Refer to the Applicable Trouble Shooting Tables".
- (b) Comment 1.h.2.a applies to the section on "Pump Overloads Driver".
- (c) In addition to the present remedy for "Suction Lift Too High" under the topic "Pump Loses Prime After Starting", add the following remedy: "Check the Level in the Supply Tank".
- (d) Comment 1.h.2.c applies to the cause of "Suction Lift Too High", under the topic of "Pump Discharge Pressure Low".
- (e) Under the topic of "Low Capacity" revise the remedy, for "Speed Too Low", to read as follows: "Check Speed of Drive and Refer to the Applicable Trouble Shooting Tables".

(i) Section 1-4-5 - Reassembly (Page 1-4-2)

- (1) The second sentence in Item 7 should be revised to read as follows: "Coat both sides of the gasket with a graphite-oil mixture."
- (2) In Item 9, delete the word "Correct" and insert the word "Connect".
- (3) Delete Item 11, and insert the following: "Start the Unit and Check for Leaks".

(j) Table of Contents (Distiller Sea Water Heater Drain Pump)

- (1) Comments 1.d.1 to 1.d.4 inclusive apply to Pages 2-i and 2-ii.

DE1052 Class/S58(2-6207-M)

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1. (Cont'd)

(k) General Information Page 2-1-1- & 2-1-2

- (1) Under General Data, delete the words "Close Coupled" and insert "Flexibly-Coupled".
- (2) Delete "Buffalo Shop Orders - 550373-400" and insert "Class - D-1: Horizontal, Multi-Stage".
- (3) Between the items of "Total Head, PSI" and "Specific Gravity", insert "Liquid Handled - Water".
- (4) Delete "Rotation - CCW", or further qualify this item to indicate the location from which the rotation is viewed, i.e. CCW as viewed from the pump end, or CCW as viewed from the motor end.
- (5) Comment 1.e.3 applies to the weight information on Page 2-1-2.
- (6) Under General Data for the Motor, Page 2-1-2, add the following: "Military Specification MIL-M-17060B".
- (7) Comment 1.e.4 applies to the reference drawing information on Page 2-1-2.

(l) Detailed Description - Pages 2-1-4 & 2-1-5

- (1) In the second paragraph under the topic of "Casing", correct the spelling of the word "Labyrinth".
- (2) Under the topic of "Bearings", after the last sentence, add the following: "Note: See Table 2.4.1".
- (3) On Page 2-1-5, under the topic of Lubrication, add the following: "Note: See Table 2.4.1".

(m) Installation - Section 2

- (1) On Page 2-2-3 revise Item 11 to read as follows:

"If it becomes necessary to realign the pump and motor, so that the original dowels between the pump or motor and the subbase are no longer in alignment, drill and ream new dowel holes and install new dowels. Be sure that all hold down bolts are drawn up tightly while drilling and reaming dowel holes".

DE1052 Class/358(2-6207-N)

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1. (Cont'd)

(n) Trouble Shooting

(1) The Trouble Shooting Table, on Pages 2-4-2 to 2-4-5, should be modified to accommodate the following:

(a) Comment 1.h.2.a applies to the section on "Noisy Installation", and to the section on "Pump Overloads Driver".

(b) Comment 1.h.2.c applies to the cause of "Suction Lift Too High" under the trouble of "Pump Loses Prime after Starting" and the trouble of "Pump Discharge Pressure Low".

(c) Comment 1.h.2.e applies to the trouble of "Low Capacity".

(d) Under the trouble of "Stuffing Box Overheats", add the following cause and remedy: "Improper Installation of Seal Cage and Packing --- check to see that the Seal Cage and Packing are inserted in the proper sequence (See Fig. 2-6-2)".

(o) Adjustments and Tests - Page 2-4-6

(1) Revise the "Pressure Test" procedure to read as follows:

"After complete reassembly, start the unit. Carefully inspect the unit for leaks, and correct as required".

(p) Maintenance and Repair - Section 2-4-5

(1) On Page 2-4-9, under the topic of gaskets, delete the last sentence and insert the following:

"Coat both side of the gaskets with graphite and oil before replacing the gaskets".

(q) Rotor Installation - Page 2-4-10

(1) Under Item 5, on Page 2-4-11, delete the second sentence and insert the following:

"Reconnect the piping, if disconnected, and start the unit".

DE1052 Class/558(2-6207-N)

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2. The subject manual should be revised in accordance with the foregoing. Upon receipt of a NAVSHIPS Number and compliance with the above, the manufacturer should effect publication and distribution in accordance with purchase order requirements.

3. By separate correspondence, the Design Agent is requesting a NAVSHIPS Number for the subject manual. The NAVSHIPS Number will be forwarded to the manufacturer as soon as it becomes available.

4. It should be noted that action on Reference (c) is the topic of separate correspondence. Notification of approval of Reference (c) and the appropriate changes required thereof, will be forwarded to the manufacturer as soon as it becomes available.

5. Acknowledgement of compliance with the above is requested by 29 March 1968.

TODD SHIPYARDS CORPORATION
(SEATTLE DIVISION)
BY GIBBS & COX, INC.
W. C. BACEMAN


R. P. FULTON
By direction

RLB/crc

cc: Todd, Seattle

Todd, New York

Buffalo Pumps
North Tonawanda, N.Y. 14121
Attn: Mr. R. Hardison

Exhibit L

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MIL-I-15024(SHIPS)
 19 September 1952
 Used IN LIEU OF
 MIL-N-2716
 23 August 1951
 SUPERSEDING
 RE13A518C
 15 August 1943

INTERIM MILITARY SPECIFICATION
 IDENTIFICATION PLATES, INFORMATION PLATES AND MARKING INFORMATION FOR
 IDENTIFICATION OF ELECTRICAL, ELECTRONIC AND
 MECHANICAL EQUIPMENT

1. SCOPE

1.1 Scope. - This specification covers the material requirements for "identification plates" and "information plates" and the marking information for "identification plates" mounted on "major units" and "sets" of Bureau of Ships equipment.

1.2 Classification. - "Identification plates" and "information plates" shall be furnished in the following type plates as specified (see 6.1):

Type A - Etched
 Type B - Engraved
 Type C - Stamped
 Type D - Cast
 Type E - Stenciled
 Type F - Graphic
 Type G - Decalcomanias
 Type H - Photographic

2. APPLICABLE SPECIFICATIONS, STANDARDS, DRAWINGS, AND PUBLICATIONS

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

TT-P-141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling and Testing.
 TT-C-595 - Colors; (for) Ready-Mixed Paints.

MILITARY

MIL-P-78 - Plastic-Material, Laminated, Thermosetting (for Designation Plates).
 MIL-S-854 - Steel, Corrosion-Resisting: Plates, Sheets, Strips, and Structural Shapes.
 MIL-N-894 - Nickel-Copper-Alloy; Wrought.
 MIL-P-15037 - Plastic-Material, Laminated Thermosetting, Sheets, Glass-Cloth
 Melamine-Resin.

NAVY DEPARTMENT

General Specifications for Inspection of Material.
 47A11 - Aluminum-Alloy (Al-52) (Aluminum-Magnesium-Chromium); Plates, Sheets, and Strips.

GPO-O-NAV-K-452

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MIL-I-15024(SHIPS)

STANDARDS

MILITARY

MIL-STD-12 - Abbreviations for Use on Drawings.

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Definitions. -

3.1.1 "Identification plates". - The words "identification plates" wherever used herein shall refer to the identification of "major units" or "sets" of Bureau of Ships equipment.

3.1.2 "Information plates". - The words "information plates" wherever used herein shall refer to instruction plates, wiring diagrams, graphic charts and other designation plates.

3.1.3 "Major unit". - A major unit shall be an electrical, mechanical or hydraulic grouping of parts, subassemblies, assemblies or accessories fixed or joined together into one item.

Examples:

Radar transmitters
Reduction gears
Internal combustion engines
Gyro compass
Loudspeakers
Sonar receivers
Motor generators

Laundry washers
Dish washers
Garbage grinders
Printing and photolitho equipment
Flatwork ironers
Food mixers
Laundry extractors

3.1.4 "Set". - A set shall be a grouping of two or more major units which are electrically, mechanically or hydraulically connected or associated together to perform their intended function.

Examples:

Public address set
Radar set
Diesel generator set

3.2 Materials. -

3.2.1 General. - Identification plates and information plates shall be made of a material that shall withstand the same environmental conditions as the item to which the plates are to be attached. The individual equipment specification shall specify what material is to be used for each application. The general guide for the selecting of material for plates shall be (in order of preference):

- (a) Nickel copper alloy (monel) (Specification MIL-N-894).
- (b) Brass (commercial).
- (c) Corrosion resisting steel (class 9, condition a, finish 1, Specification MIL-S-854).
- (d) Aluminum alloy (Specification 47A11).
- (e) Plastic (for application not directly exposed to weather) (Specification MIL-P-78 or MIL-P-15037).
- (f) Decalcomanias, rubber stamping, stencilling, etc. (for non-metal applications).

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3.2.1.1 Where the scarcity of critical materials prevent the use of nickel-copper alloy, other materials in the order listed shall be used. Brass plates shall not be mounted directly on aluminum. Edges of plastic plates shall be beveled. The surfaces of plastic plates shall have a gloss factor of 25 ± 10 units (Spec. TT-P-141).

3.2.1.2 Color of laminations for plastic plates. - Except for type GMG laminates, the color values of the various lamination for types B, E, and F plastic plates shall conform to Specification MIL-P-78. Colors of cores and cover sheets shall be as specified (see 6.1).

3.2.1.3 Background. - When specified (see 6.1) the background of the plate shall be lusterless orange 3205, conforming to Specification TT-C-595.

3.3 Dimensions for plates. -

3.3.1 Identification plates. - Identification plate dimensions shall depend upon the size of the major unit or set and shall be selected from the standard sizes listed in table I. Adequate space shall be provided to accommodate the information arrangement necessary to suit the format (see 3.7). Standard dimensions for identification plates shall be indicated by size numbers as specified (see 6.1).

Table I - Standard dimensions, identification plates.

Size-number	Length (in.)	Width (in.)	Diameter of holes (in.)	Hole center to edge (in.)	Number of holes
1	2	3/4	1/8	3/16	2
2	2	1	1/8	3/16	2
3	2	2	1/8	3/16	4
4	3	1	1/8	3/16	2
5	3	2	1/8	3/16	4
6	3	3	1/8	3/16	4
7	4	1-1/2	1/8	3/16	4
8	4	2	1/8	3/16	4
9	4	3	1/8	3/16	4
10	4	4	1/8	3/16	4
11	5	2	5/32	3/16	4
12	5	3	5/32	3/16	4
13	5	4	5/32	3/16	4
14	5	5	5/32	3/16	4
15	6	2	5/32	3/16	4
16	6	3	5/32	3/16	4
17	6	4	5/32	3/16	4
18	6	5	5/32	3/16	4
19	6	6	5/32	3/16	4
20	7	2	5/32	3/16	4
21	7	3	5/32	3/16	4
22	7	4	5/32	3/16	4
23	7	5	5/32	3/16	4
24	7	6	5/32	3/16	4
25	7	7	5/32	3/16	4

3.3.2 Information plate dimensions shall be submitted by the contractor to the bureau or agency concerned for approval.

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MIL-I-15024(SHIPS)

3.4 Marking information. -

3.4.1 Identification plates. - Marking information to appear on identification plates shall be in accordance with the following subparagraphs outlined and shall be submitted to the bureau or agency concerned for approval. Information which does not pertain to the major unit or set shall be omitted. When the size of the major unit or set restricts the inclusion of the information listed below, only the most essential information shall be included as approved by the bureau or agency concerned.

3.4.1.1 Major unit name and Government type designation. - The major unit name shall be the approved Munitions Board Catalog Agency (MBCA) item name. In the absence of such an approved name, the name in official use may be used. Where a Government type designation includes a name which does not coincide with the MBCA item name, the Government type designation shall prevail. Where space precludes use of the entire major unit name, or set name words, (except the principle noun) may be abbreviated in accordance with Standard MIL-STD-12.

3.4.1.2 Stock number. - The stock number shall be as specified (see 6.1). The source of the stock number shall be indicated. The use of a stock number on an identification plate shall be at the discretion and as specified by the bureau or agency concerned.

3.4.1.3 Serial number. - The serial number shall be entered when required (see 6.1). If a Government serial number is not assigned, the contractor's serial number may be entered upon the approval of the bureau or agency concerned or prime contractors.

3.4.1.4 Manufacturer's or prime contractor's data. - The manufacturer's name, part and drawing or model number shall be entered as applicable when required (see 6.1). This information shall refer to the actual manufacturer or prime contractor. The location of manufacture shall not appear on plates.

3.4.1.5 Contract number. - The procuring activity's contract or purchase order number shall be entered as the contract number. When an order shows both a contract number and a purchase order number, the purchase order number shall be used.

3.4.1.6 U.S. property. - The words "U. S. PROPERTY" shall be inserted at the bottom of the plate.

3.4.1.7 Operating characteristics. - Under this heading shall be entered the information necessary for the safe handling, operation and maintenance of the major unit or set. An additional space or an additional block may be provided as shown on figure 1 for inclusion of this information. The typical operating characteristics for electrical, electronic and mechanical major units and sets shall be as specified in figures 2, 3, and 4 and shall be subject to the approval of the bureau or agency concerned.

3.4.2 Information plates. - Marking information to appear on information plates shall be submitted by the contractor to the bureau or agency concerned for approval.

3.4.3 Marking information, together with views of the complete plate, shall be shown on the working drawings of the equipment concerned.

3.5 Type of marking for plates. - Letters shall be of Gothic capitals, and numerals and other characters shall be of similar appearance. Letters, numerals, and other characters shall be of such size as to be clearly legible. The principal words or group of words and the Government type identification (name of the major unit or set to which identification plate and information plate is to be attached) shall be emphasized by the use of larger letters.

3.5.1 Methods of marking. - The marking shall be made by a method which shall produce permanent and durable markings on identification plates and information plates to withstand the environmental conditions of the major units or sets to which the plates are to be attached. Serial numbers and other designations which vary on each identification plate and information plate may be etched, impression-stamped or punched into the area provided.

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3.5.2 Temporary markings. - The use of decalcomanias, rubber stampings, stencillings or other markings of information of a temporary nature will not be allowed without the specific approval of the bureau or agency concerned, in which case the markings shall be covered with a coat of clear lacquer. Unless otherwise specified in the contract or order, decalcomanias, rubber stampings, stencillings or other markings of information of a temporary nature are not required to withstand the same environmental conditions as the major unit or set to which they are to be attached.

3.5.3 Legibility. - Legibility of the letters, numerals and other characters shall be as necessary for easy readability.

3.5.4 Filling of markings. -

3.5.4.1 All engraved, stamped, or etched letters, numerals and other characters on metal plates shall be well filled with a hard paint, enamel, or lacquer of a contrasting color, as specified (see 8.1) and the face of the plates shall be covered with a moisture-resistant varnish.

3.5.4.2 Plastic plates engraved through one lamination so as to show a lamination of a contrasting color shall not have the letters, numerals and other characters filled.

3.6 Mounting and location. - Identification plates and information plates shall be mounted in a conspicuous place generally on the front panel of the major unit or set. Plates shall be mounted on major units or sets either externally or internally in locations easily accessible to for normal operation and in the event of an emergency. The mounting and location of plates shall be shown on the mechanical assembly drawing of the equipment. In the event the size or nature of the major unit or set precludes the mounting of an identification plate or information plate, information may be marked directly on the major unit or set by means of decalcomanias, rubber stamping, stenciling or other means upon the specific approval of the bureau or agency concerned. The plates shall not be positioned so as to interfere with controls or obscure other required information. Plates shall not be mounted by means of rivets, self tapping screws or welding. Unless otherwise specified in the contract or order, provision shall be made for securely fastening plates with machine screws or hardened steel drive screws. Plates of nickel-copper alloy material in locations exposed to the weather shall be mounted by nickel-copper alloy machine screws. Plates to be mounted on refrigerator major units or sets shall be soft soldered to tank or receiver.

3.7 Format for plates. -

3.7.1 Identification plates. - For guidance purposes only, the arrangement of the marking information for electrical, electronic and mechanical major units or sets shall be as suggested in figures 2, 3, and 4 and shall be submitted by the contractor to the bureau or agency concerned for approval. The format may be varied to suit the major unit or set to which the identification plate is to be attached.

3.7.2 Information plates. - The arrangement of the marking information shall be submitted by the contractor to the bureau or agency concerned for approval.

3.8 Type A (etched). -

3.8.1 Material. - Type A plates shall be of one of the following materials:

Corrosion-resisting steel.
Nickel-copper alloy.
Aluminum alloy.
Brass.

3.8.2 Marking. - Letters, numerals, and other characters shall be etched. Additional information if necessary may be stamped on the plate.

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3.8.3 Dimensions. - Etched letters, numerals and other characters shall not be less than 0.003 inch deep. Stampings of additional information shall not be less than 0.003 inch deep. The thickness of the A plates shall be as follows:

Corrosion resisting steel - 0.03 inch
 Nickel copper alloy - 0.03 inch
 Aluminum alloy - 0.05 inch
 Brass - 0.05 inch

3.9 Type B (engraved). -

3.9.1 Materials. - Type B plates shall be of one of the materials specified in 3.8.1 or of plastic material conforming to type NDP of Specification MIL-P-78 or Specification MIL-P-15037. Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

3.9.2 Marking. - Letters, numerals and other characters shall be engraved. Additional information if necessary may be stamped on the plate.

3.9.3 Dimensions. - The depth of engraving and thickness shall be as specified hereinafter. Stampings of additional information shall not be less than 0.003 inch deep.

<u>Plate material</u>	<u>Minimum depth of engraving (inch)</u>	<u>Thickness (inch)</u>
Plastic	0.003	0.0625
Brass or aluminum alloy	.003	.05
Nickel-copper alloy	.003	.03
Corrosion-resisting steel	.003	.03

3.10 Type C (stamped). -

3.10.1 Materials. - Type C plates shall be of one of the following materials:

Brass.
 Nickel-copper alloy.
 Corrosion-resisting steel.

3.10.2 Marking. - Letters, numerals and other characters shall be stamped on the plate. Embossing or relief stamping is not acceptable.

3.10.3 Dimensions. - Stamping shall not be less than 0.003 inch deep. Thickness of type C plates used shall be in accordance with 3.8.3.

3.11 Type D (cast). -

3.11.1 Materials. - Type D plates shall be of cast brass or bronze of commercial quality.

3.11.2 Marking. - Letters, numerals and other characters shall be raised above the body of the plate and shall be polished, the balance of the plate to have a roughened or stippled finish. Additional information if necessary may be stamped on the plate.

3.11.3 Dimensions. - Letters, numerals and other characters shall be raised to 0.03 inch. Thickness of type D plates shall be as specified (see 6.1).

3.12 Type E (stenciled). -

3.12.1 Material. - Type E plates shall be of plastic material conforming to type HSP of Specification MIL-P-78 or Specification MIL-P-15037. Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

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MIL-I-15024(SHIPS)

3.12.2 Marking. - Letters, numerals and other characters shall be stenciled on the plate. Marking shall be applied by lithographing, by the silk screen method (method of printing through a stencil that is bonded to a silk screen) or a similar process.

3.12.3 Dimensions. - Thickness of type E plates shall be 0.0625 inch.

3.13 Type F (graphic). -

3.13.1 Material. - Type F plates shall be of plastic material, type GCP-H (Specification MIL-P-78). Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

3.13.2 Marking. - The printed information shall be included between the laminations and shall be clearly legible through a transparent outer layer.

3.13.3 Dimensions. - Thickness of type F plates shall be 0.0625 inch.

3.14 Type G (decalcomanias). -

3.14.1 General. - Decalcomanias shall be mounted on major units normally considered expendable and which do not require permanent marking information to withstand the environmental conditions of the major unit or set. Decalcomanias in general unless otherwise specified in the contract or order, shall be used to indicate the information necessary for delivery, handling, preliminary and/or final installation and/or operation of the major unit or set. Decalcomanias may also be used upon specific approval of the bureau or agency concerned on major units or sets subject to radioactive contamination.

3.14.2 Materials. - The plates shall be made of materials supplied by manufacturer's of decalcomanias approved by the bureau or agency concerned. Decalcomania materials shall depend upon the type of material, surface finish and exposure of the major unit or set to which the decalcomania is to be affixed.

3.14.3 Marking. - Letters, numerals and other characters shall be of the open letter design or solid letter design. The open letter design shall have the background omitted and the solid letter design shall have the letters, numerals and other characters integral with the background. Additional markings may be rubber stamped or lettered directly on the decalcomania before mounting.

3.14.4 Dimensions. - Thickness of type C plates shall depend upon the material and the expected life endurance of the decalcomania necessary for the delivery, handling, preliminary or final installation, and operation of the major unit or set to which the decalcomania is to be affixed.

3.14.5 Mounting. - Decalcomanias shall be designed for mounting on metallic, phenolic or organic surface finishes. Mounting of decalcomanias shall be in accordance with standard application procedures specified by the manufacturer of decalcomanias and approved by the bureau or agency concerned. Properly applied decalcomanias shall be firmly adhered and free of bubbles or loose edges. Should a transfer be damaged beyond usefulness after its application, a second transfer may be applied directly over the first transfer.

3.15 Type H (photographic). -

3.15.1 Materials. - Type H plates shall be of one of the following materials depending upon the photographic process used:

Corrosion-resisting steel
Aluminum

3.15.2 Marking. - Letters, numerals and other characters shall be integrated into the plate by a photographic process approved by the bureau or agency concerned and as specified (see 6.1). Stamping of additional marking information will not be permitted on type H plates.

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3.15.3 Dimensions. - Thickness of type H plates shall be as follows:

<u>Plate material</u>	<u>Thickness (inch)</u>
Corrosion-resisting steel	0.0156
Aluminum	0.02

3.16. Workmanship. - Identification plates and information plates shall be furnished with smooth edges and shall be free from sharp corners. Unless otherwise specified in the contract or order, identification plates and information plates shall be suitable for mounting on finished major units or sets.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Inspection procedures. - For Naval purchases, the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

4.2 Inspection and tests shall be conducted to determine that the material employed is in accordance with the requirements of the applicable material specification. Inspection and tests shall also be conducted to determine that the letters, numerals and other characters are of the specified height on cast identification plates and information plates or are stamped, etched, or engraved to the depth required. In determining the depth of stamping, etching, or engraving, care should be exercised in removing the filling material to insure that all material is removed. Surface inspection shall also be conducted to insure that the identification plates and information plates furnished comply with the requirements of the contract or order regarding dimensions, thickness, format, life endurance and finish. No chemical analysis will be required for brass or bronze plates. Plates necessary for proper inspection shall be furnished in addition to those required by the contract or order and without charge to the Government. One production run sample of each type of identification plate or information plate being supplied on the contract or order shall be furnished for inspection. At the request of the bureau or agency concerned the contractor shall furnish a photographic print of each type identification plate or information plate being supplied in lieu of a production run sample.

5. PREPARATION FOR DELIVERY

5.1 There are no packaging, packing, and marking requirements applicable to this specification.

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Whether an identification or information plate is required and the type (see 1.2).
- (c) Material required (see 3.2.1, 3.8.1, 3.9.1, 3.10.1, 3.11.1, 3.12.1, 3.13.1, 3.14.1 and 3.15.1).
- (d) Color of cores and cover sheets (see 3.2.1.2).
- (e) Whether an orange background is required (see 3.2.1.3).
- (f) Size number (see 3.3.1).
- (g) Stock number (see 3.4.1.2).
- (h) Serial number if required (see 3.4.1.3).
- (i) Manufacturers or prime contractor's data if required (see 3.4.1.4).
- (j) Color of filler for metal plates (see 3.5.4.1).
- (k) Photographic process for type H plates (see 3.15.2).

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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(NAME)	TYPE	<input type="text"/>	Operating characteristics if necessary
SERIAL NO.		<input type="text"/>	
STD NAVY STOCK NO.		<input type="text"/>	
MANUFACTURED BY			DATA HERE OR BELOW
<input type="text"/>			
<input type="checkbox"/> INSP.	CONTRACT NO.	<input type="text"/>	
U.S. PROPERTY			

Operating characteristics

Figure 1.- Identification plates— General use, format showing typical operating characteristics.

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MAJOR UNIT

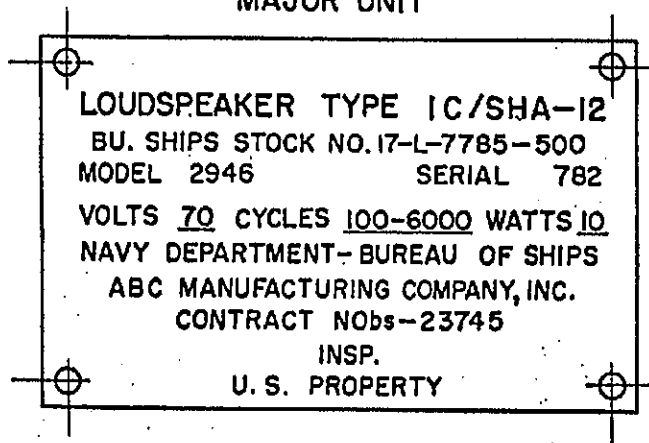


Figure 2 A.- Typical IC/FC equipment.

MAJOR UNIT FOR SET

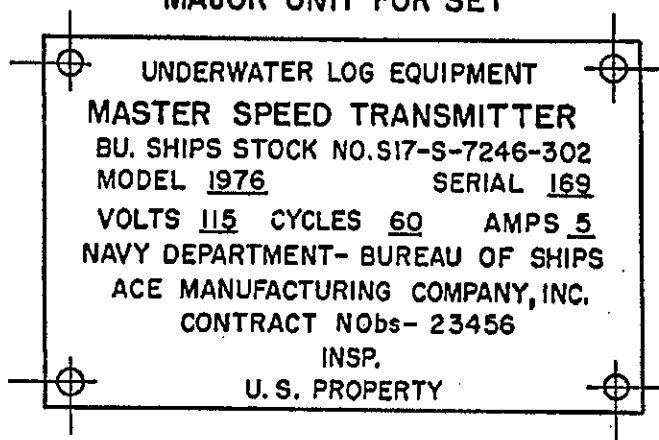


Figure 2 B.- Typical IC/FC equipment.

Figure 2.- Identification plates, electrical, format showing typical operating characteristics.

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Figure 3.—Identification plates—Electronic, format showing typical operating characteristics

SA-500/URQ-10			
MOTOR STARTER			
3.5 HP	440 VOLTS	3 PHASE	60 CYCLES
SERIAL		<input type="text"/>	
A MAJOR UNIT OF RADIO SET AN/URQ-10			
MANUFACTURED FOR			
NAVY DEPARTMENT-BUREAU OF SHIPS			
BY CONTRACTOR			
JOHN DOE MANUFACTURING CO.			
SALEM		MASS	
CONTRACT	<input type="text"/>	NObsr 99999	
U S PROPERTY			

—Space for inspectors stamp

Figure 3A.—Major unit (typical ship, shore and amphibious equipment.)



Figure 3B. ~ Set

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AN/URR-00	
RECEIVING SET, RADIO	
SUPPLY: 115 V 10 60~	SERIAL <input type="text"/>
SET CONSISTS OF ACCESSORIES AND THE FOLLOWING	
1 RECEIVER, RADIO R-000/URR-00	
NAVY DEPARTMENT	
BUREAU OF SHIPS	
CONTRACTOR & MANUFACTURER	
JOHN DOE MANUFACTURING CO	
SALEM MASS	
CONTRACT	<input type="text"/> NObsr-99999
U S PROPERTY	

Figure 3 C.- Set and major unit-combination.

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<p>0A-000/UPR-00</p> <p>INDICATOR GROUP</p> <p>SUPPLY: 220 OR 440/3/60 SERIAL <input type="text"/></p>	
<p>A UNIT OF RECEIVING SET, RADAR AN/UPR-00</p>	
<p>CONSISTS OF THE FOLLOWING</p> <p>I INDICATOR, AZIMUTH I P-000/UPR-00</p> <p>I POWER SUPPLY PP-000/UPR-00</p> <p>I CONTROL, INDICATOR C-000/URP-00</p>	
<p>MANUFACTURED FOR</p> <p>NAVY DEPARTMENT-BUREAU OF SHIPS</p> <p>BY J C COBB AND COMPANY INC.</p> <p>CONTRACTOR</p> <p>JOHN DOE MANUFACTURING CO</p> <p>SALEM MASS</p> <p>CONTRACT <input type="text"/> Nobsr-99999</p> <p>U.S. PROPERTY</p>	

Figure 3D.- Set.

<p>RT-2/ARN-1</p> <p>13 VOLTS DC</p>	
<p>NO a (s) - 1000</p>	<p><input type="text"/> :CZY</p>
<p>U S. PROPERTY</p>	

Figure 3E.- Major unit (Airborne Equipment)

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Figure 4.— Identification plates—Mechanical, format showing typical operating characteristics.

GENERATOR SET, TURBINE		
SERIAL NO. <input type="text"/>		
STD. GOVT STOCK NO. <input type="text"/>		
MANUFACTURED BY		
<input type="text"/>		
INSP <input type="text"/>	CONTRACT NO. <input type="text"/>	
TURBINE DATA		
MODEL <input type="text"/>	RPM <input type="text"/>	
STEAM, PSIG <input type="text"/>	VACUUM HG <input type="text"/>	
STEAM TEMP <input type="text"/>		
GENERATOR DATA		
MFR <input type="text"/>	MODEL <input type="text"/>	RPM <input type="text"/>
KW <input type="text"/>	VOLTS <input type="text"/>	AC or DC <input type="text"/>
U. S. PROPERTY		

Figure 4 A: Set.

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<p>MAIN REDUCTION GEAR DOUBLE REDUCTION</p> <p>SERIAL NO. _____</p> <p>STD. NAVY STOCK NO. _____</p> <p>MANUFACTURED BY _____</p> <p>INSP _____ CONTRACT NO. _____</p> <p>UNIT _____</p> <table border="0"> <tr> <td>HP PINION</td> <td>1ST. RED.</td> <td>RPM</td> <td>SHP</td> </tr> <tr> <td>LP PINION</td> <td>1ST. RED.</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MAIN GEAR</td> <td>2ND. RED.</td> <td>_____</td> <td>_____</td> </tr> </table> <p>_____</p> <p>U. S. PROPERTY</p> <p>THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY</p>	HP PINION	1ST. RED.	RPM	SHP	LP PINION	1ST. RED.	_____	_____	MAIN GEAR	2ND. RED.	_____	_____	<p>MAIN REDUCTION GEAR REVERSE TYPE</p> <p>SERIAL NO. _____</p> <p>STD. NAVY STOCK NO. _____</p> <p>MANUFACTURED BY _____</p> <p>INSP _____ CONTRACT NO. _____</p> <p>UNIT _____</p> <table border="0"> <tr> <td>AHEAD PINION</td> <td>RATIO</td> <td>RPM</td> <td>SHP</td> </tr> <tr> <td>LOW SPEED GEAR - AHEAD</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>REVERSE</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </table> <p>_____</p> <p>U. S. PROPERTY</p> <p>THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY</p>	AHEAD PINION	RATIO	RPM	SHP	LOW SPEED GEAR - AHEAD	_____	_____	_____	REVERSE	_____	_____	_____
HP PINION	1ST. RED.	RPM	SHP																						
LP PINION	1ST. RED.	_____	_____																						
MAIN GEAR	2ND. RED.	_____	_____																						
AHEAD PINION	RATIO	RPM	SHP																						
LOW SPEED GEAR - AHEAD	_____	_____	_____																						
REVERSE	_____	_____	_____																						
<p>MAIN REDUCTION GEAR SINGLE REDUCTION</p> <p>SERIAL NO. _____</p> <p>STD. NAVY STOCK NO. _____</p> <p>MANUFACTURED BY _____</p> <p>INSP _____ CONTRACT NO. _____</p> <p>UNIT _____</p> <table border="0"> <tr> <td>PINION GEAR</td> <td>RPM</td> <td>SHP</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </table> <p>_____</p> <p>U. S. PROPERTY</p> <p>THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY</p>	PINION GEAR	RPM	SHP	_____	_____	_____	<p>NAME OF EQUIPMENT USED IN _____</p> <p>REDUCTION GEAR</p> <p>SERIAL NO. _____</p> <p>MANUFACTURED BY _____</p> <p>INSP _____</p> <p>MAX RATED</p> <table border="0"> <tr> <td>PINION</td> <td>RPM</td> </tr> <tr> <td>GEAR</td> <td>RPM</td> </tr> <tr> <td></td> <td>SHP</td> </tr> </table> <p>_____</p> <p>U. S. PROPERTY</p>	PINION	RPM	GEAR	RPM		SHP												
PINION GEAR	RPM	SHP																							
_____	_____	_____																							
PINION	RPM																								
GEAR	RPM																								
	SHP																								

Figure 4B.- Typical reduction gears major unit

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IDENTIFICATION PLATE FOR COMBINED LP AND ASTERN TURBINE

MAIN TURBINE		UNIT	
SERIAL NO.			
STD. NAVY STOCK NO.			
MANUFACTURED BY			
INSP	CONTRACT NO.		
AHEAD		SHP	ASTERN ELEMENT
		TURBINE RPM	
PSIG		°F TEMPERATURE	
OVERSPEED RPM		EXH PRESS. ABS	
U. S. PROPERTY			

THIS SPACE FOR LIFT WEIGHTS ONLY

IDENTIFICATION PLATE FOR CRUISING, HP AND ELECTRIC DRIVE TURBINE

MAIN TURBINE		UNIT	
SERIAL NO.			
STD. NAVY STOCK NO.			
MANUFACTURED BY			
INSP	CONTRACT NO.		
TURBINE SHP		OVERSPEED RPM	
TURBINE RPM		EXH PRESS. ABS	
PSIG		°F TEMPERATURE	
U. S. PROPERTY			

THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY

IDENTIFICATION PLATE FOR
AUXILIARY TURBINE

TURBINE		NAME OF EQUIPMENT TO BE USED IN	
SERIAL NO.			
MANUFACTURED BY			
INSP			
TYPE		MAX RATED BHP	
MAX RATED RPM		OVERSPEED RPM	
PSIG		°F TEMPERATURE	
EXH. PRESS.			
RELIEF VALVE SETTING			
BACK PRESS TRIP SETTING			
OVERSPEED TRIP SETTING			
U. S. PROPERTY			

Figure 4 C.— Major unit typical turbines.

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BOILER NO. <input type="text"/>	
SERIAL NO. <input type="text"/>	
STD. NAVY STOCK NO. <input type="text"/>	
MANUFACTURED BY <input type="text"/>	
INSP <input type="checkbox"/>	CONTRACT NO. <input type="text"/>
DESIGN PRESS. <input type="text"/> PSI	DESIGN STEAM TEMP <input type="text"/> °F
MAX. STEAM DRUM PRESS. <input type="text"/> PSI	HYDROSTATIC TEST PRESS. <input type="text"/> PSI
AUTHORIZED SAFETY VALVE SETTING PSI	
POPPING RESEATING	POPPING RESEATING
DRUM VALVE NO. 1 <input type="text"/>	DRUM VALVE NO. 2 <input type="text"/>
DRUM PILOT VALVE <input type="text"/>	SUPERHEATER VALVE <input type="text"/>
U. S. PROPERTY	

AUXILIARY BOILER TYPE <input type="text"/>	
SERIAL NO. <input type="text"/>	
STD. NAVY STOCK NO. <input type="text"/>	
MANUFACTURED BY <input type="text"/>	
INSP <input type="checkbox"/>	CONTRACT NO. <input type="text"/>
DESIGN PRESS. <input type="text"/> PSI	OPERATING PRESS. <input type="text"/> PSI
HYDROSTATIC TEST PRESSURE <input type="text"/> PSI	
SAFETY VALVE SETTING <input type="text"/> PSI	
ELECTRICAL CHARACTERISTICS <input type="text"/> VOLTS (AC OR DC)	
U S PROPERTY	

Figure 4D. - Major unit typical boilers

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CONDENSER		TYPE	
SERIAL NO.			
STD. NAVY STOCK NO.			
MANUFACTURED BY			
INSP	CONTRACT NO.		
HYDROSTATIC TEST PRESSURE			
SHELL AND WATER BOXES		PSIG	
SHELL AFTER TUBING		PSIG	
TUBE MATERIAL	NUMBER OF PASSES		
WATER VELOCITY		FT/SEC. AT	
COOLING SURFACE		SQ. FT.	
U. S. PROPERTY			

REFRIGERATING CONDENSER			
SERIAL NO.			
STD. NAVY STOCK NO.			
MANUFACTURED BY			
INSP	CONTRACT NO.		
REFRIGERANT			
CONDENSING SIDE		WATER SIDE	
TEST PRESS.		TEST PRESS.	
PSIG		PSIG	
SHELL DIA.	TUBE LENGTH	NO. PASSES	
WATER VELOCITY		FT/SEC. AT	
COOLING SURFACE		SQ. FT.	
U. S. PROPERTY			

Note: Identification plates shall be soft
soldered to tank or receiver.

Figure 4 E.—Major units typical condensers.

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COMPRESSOR <input type="text"/>		SERVICE
SERIAL NO. <input type="text"/>		
STD. NAVY STOCK NO. <input type="text"/>		
MANUFACTURED BY		
<input type="text"/>		
INSP <input type="checkbox"/>	CONTRACT NO. <input type="text"/>	
TYPE <input type="text"/>	BORE <input type="text"/>	STROKE <input type="text"/>
NO. CYL. <input type="text"/>	RPM <input type="text"/>	
CAP. <input type="text"/>	BTU/HR AT <input type="text"/> °F SUCTION AND	
<input type="text"/> °F CONDENSING TEMPERATURE		
TEST PRESSURE <input type="text"/> PSIG		
WORKING PRESSURE <input type="text"/> PSIG		
U. S. PROPERTY		

Figure 4F.

TANK OR RECEIVER, TYPE <input type="text"/>	
SERIAL NO. <input type="text"/>	
STD. NAVY STOCK NO. <input type="text"/>	
MANUFACTURED BY	
<input type="text"/>	
INSP <input type="checkbox"/>	CONTRACT NO. <input type="text"/>
HYDROSTATIC TEST PRESS. <input type="text"/> PSIG	
CAPACITY <input type="text"/>	
SHELL DIA. <input type="text"/>	LENGTH <input type="text"/>
U. S. PROPERTY	

Note: Identification plate shall be
soft soldered to tank or receiver.

Figure 4G.

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INT. COMB. ENGINE		TYPE	
SERIAL NO.			
STD. NAVY STOCK NO.			
MANUFACTURED BY			
INSP	CONTRACT NO.		
MODEL NO.		HAND	
RPM		ROTATION	
BHP		BORE & STROKE	
U. S. PROPERTY			

Figure 4 H

FORCED DRAFT BLOWER	
SERIAL NO.	
STD. NAVY STOCK NO.	
MANUFACTURED BY	
INSP	CONTRACT NO.
PSIG	EXH PRESS.
OF TEMP	BHP
TYPE	SIZE
RELIEF VALVE SETTING	
OPERATING CONDITIONS	
MAXIMUM	NORMAL
CAP. CFM	CAP. CFM
RPM	RPM
SP IN. WATER	SP IN. WATER
OVERSPEED TEST RPM	
U. S. PROPERTY	

Figure 4 J

Exhibit M

MIL-P-15024B(SHIPS)
5 November 1956
SUPERSEDING
MIL-I-15024A(SHIPS)
31 March 1955

MILITARY SPECIFICATION
PLATES, IDENTIFICATION—INFORMATION AND MARKING FOR
IDENTIFICATION OF ELECTRICAL, ELECTRONIC
AND MECHANICAL EQUIPMENT

1. SCOPE

1.1 Scope. - This specification covers the material requirements for "identification plates" and "information plates" and the marking information for "identification plates" mounted on units assemblies, and equipments of Bureau of Ships material.

1.2 Classification. - "Identification plates" and "information plates" shall be furnished in the following types, as specified (see 6. 1):

Type A - Etched.
Type B - Engraved.
Type C - Stamped
Type D - Cast.
Type E - Stenciled.
Type F - Laminated.
Type G - Decalcomanias or adhesive backed metal foil.
Type H - Photographic.
Type I - Embossed.

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

QQ-A-318 - Aluminum - Alloy 52S, Plates and Sheets.
QQ-S-766 - Steel, Corrosion Resisting: Plates, Sheets, and Strips.
TT-C-595 - Colors; (for) Ready-Mixed Paints.
TT-P-141 - Paint, Varnish, Lacquer, and Related Material: Methods of Inspection, Sampling and Testing.

MILITARY

MIL-P-78 - Plastic-Material Laminated, Thermosetting (for Designation Plates).
MIL-N-894 - Nickel-Copper Alloy Bars, Plates, and Other Wrought Forms.
MIL-B-895 - Brass, Commercial; Bars, Forgings, Plates, Rods, Shapes, Sheets and Strips.
MIL-D-8634 - Decalcomanias: for Use on Exterior Surfaces of Aircraft.
MIL-P-15037 - Plastic-Material, Laminated Thermosetting; Sheets, Glass-Cloth Melamine-Resin.

FSC 9905

MIL-P-15024B(SHIPS)

NAVY DEPARTMENT
General Specifications for Inspection of Material.

STANDARDS

MILITARY

MIL-STD-130 - Identification Marking of U.S. Military Property.
MIL-STD-280 - Definition of Terms for Equipment Divisions.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Definitions. - For the purpose of this specification the following definitions apply:

3.1.1 "Identification plates". - The words "identification plates" wherever used herein shall refer to the identification plates for units, assemblies, or equipments of Bureau of Ships material.

3.1.2 "Information plates". - The words "information plates" wherever used herein shall refer to instruction, safety or warning plates, wiring diagrams, graphic charts, and other designation plates.

3.1.3 Definitions of other terms such as part, assembly, unit, equipment (set) shall be in accordance with Standard MIL-STD-280.

3.2 Marking information and format. - Marking information to be shown on identification plates or to be marked on parts, shall be consistent with the requirements of Standard MIL-STD-130. The arrangement of the information together with the desired special characteristics shall be in accordance with the applicable figures 1 through 5. The marking information for a particular item, together with views of typical plates, shall be shown on the working drawings of the item concerned.

3.2.1 Information plates. - Marking information to appear on information plates and the arrangement of the information shall be submitted to the bureau or agency concerned for approval.

3.2.2 Weight. - Lifting weight shall be indicated on either identification or information plate for items susceptible for frequent handling, such as motor-generators, reduction gears, and turbines.

3.3 Type of marking. - Letters shall be of Gothic capitals, and numerals and other characters shall be of similar appearance. The principal words or group of words and the Government type identification (name and Government designation of the item to which the identification plate will be attached) shall be emphasized by the use of larger letters. See figures 2 to 5 inclusive for typical sizes of markings.

3.3.1 Methods of marking. - The marking shall be made by a method which shall produce permanent and durable markings on identification plates and information plates to withstand the environmental conditions of the item to which the plates will be attached. Serial numbers and other designations which vary on each identification plate and information plate may be etched, impression-stamped, or punched into the area provided.

3.3.1.1 Marking of parts. - The marking of parts shall be made by a method which will produce markings of sufficient durability to last the anticipated life of the part under the environmental conditions to which it will be subjected.

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3.3.2 Temporary markings. - The use of decalcomanias, rubber stampings, stencils or other markings of information of a temporary nature will not be allowed without the specific approval of the bureau or agency concerned, in which case the markings shall be covered with a coat of clear lacquer. Unless otherwise specified in the contract or order, decalcomanias, rubber stampings, stencils, or other markings of information of a temporary nature will not be required to withstand the same environmental conditions as the item to which they will be attached.

3.3.3 Legibility. - The size of the letters, numerals, and other characters shall be as necessary for easy readability.

3.3.4 Filling of markings. -

3.3.4.1 All engraved, stamped, or direct etched letters, numerals, and other characters on metal plates and background on reversed etched metal plates shall be well filled with a hard paint, enamel, or lacquer of a contrasting color as specified (see 6.1) and the face of the plates shall be covered with a moisture-resistant varnish. Black enamel shall be used for filling markings on plates for propulsion and auxiliary turbines and gears.

3.3.4.2 Plastic plates engraved through one lamination so as to show a lamination of a contrasting color shall not have letters, numerals, and other characters filled.

3.4 Mounting and location. - Identification plates and information plates shall be mounted in a conspicuous place generally on the front or front panel of the item. When space does not permit mounting the approved plate on the front panel, the Government assigned identification and serial number shall be permanently marked on the front panel of each unit, as appropriate, in addition to the mounting of the approved plate on other than the front panel. Plates shall be mounted either externally or internally in locations easily accessible during operation. The mounting and location of plates shall be shown on the mechanical assembly drawing of the item. If the size or nature of the item precludes the mounting of an identification plate or information plate, information may be marked directly on the item by means of decalcomanias, adhesive backed metal foil, rubber stamping, stenciling, or other means, upon the specific approval of the bureau or agency concerned. The plates shall not be positioned so as to interfere with controls or obscure other required information. The mounting and location of plates shall not adversely effect the strength of the item on which the plate is mounted. In general plates shall not be mounted by means of rivets, self-tapping screws, or welding. However self-tapping screws may be used to mount identification plates on the sides of the following types of nonrotating electric equipment: dripproof, dripproof protected, enclosed ventilated, fogproof, open, protected, splashproof, and totally enclosed. The arrangement shall be such that the screw completely penetrates the enclosure. The point of the screw shall not endanger personnel or the interior electric equipment. Metal plates shall be mounted by removable type screws made of the same material as the plate. Plastic plates shall be mounted by corrosion-resisting screws. Plates of nickel-copper-alloy material in locations exposed to the weather shall be mounted by nickel-copper-alloy machine screws. Plates to be mounted on refrigerating condensers, chillers, or receivers shall be soft-soldered to the shell.

3.5 Materials. -

3.5.1 General. - Identification plates and information plates shall be made of a material that shall withstand the same environmental conditions as the item to which the plates will be attached. The individual equipment specification shall specify what material is to be used for each application which may be the same as the material of the item on which the plate is mounted. The general guide for the selecting of material for plates shall be (in order of preference):

- (a) Nickel-copper-alloy (Monel) (Specification MIL-N-894).
- (b) Brass (commercial) (Specification MIL-B-895).
- (c) Corrosion-resisting steel (class FS-316, Specification QQ-S-766).
- (d) Aluminum alloy (Specification QQ-A-318).

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- (e) Plastic (for application not directly exposed to weather)
(Spec. MIL-P-78 or MIL-P-15037).
- (f) Decalcomanias, adhesive backed metal foil, rubber stamping
stenciling.

3.5.1.1 Where the scarcity of critical materials prevents the use of nickel-copper alloy, other materials in the order listed shall be used. Brass plates shall not be mounted directly on aluminum. Edges of plastic plates shall be beveled. The surfaces of plastic plates shall have a gloss factor of 25 ± 10 units (Spec. TT-P-141).

3.5.1.2 Color of laminations for plastic plates. - Except for type GMG laminates, the color values of the various lamination for types B, E, and F plastic plates shall conform to Specification MIL-P-78. Colors of cores and cover sheets shall be as specified (see 6.1).

3.5.1.3 Background. - On electronic equipment the background of unit plates shall be lusterless black (3727); the background of set plates shall be lusterless orange (3205), conforming to Specification TT-C-595.

3.5.1.4 Plating of brass plates will be satisfactory when so specified in the individual equipment specification.

3.6 Dimensions for plates. -

3.6.1 Identification plates. - Identification plate dimensions shall depend upon the size of the major unit or set and shall be selected from the standard sizes listed in table I. Where the unit, equipment, assembly, or part is too small to permit the installation of a size 1 plate as specified in table I, the size and thickness of the plate, information to be included thereon and method of mounting or attachment shall be as acceptable to the bureau or agency concerned. Sizes of identification plates for propulsion turbines and gears shall not exceed 6 inches in length (size 10). Sizes of identification plates for auxiliary turbines and gears shall not exceed 4 inches in length (size 10) (see figures 4B and 4C). For electronic equipments the preferred sizes are size 5 for units, size 6 for assemblies and groups, and size 9 for sets, size 4 for unit modification plates and

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size 7 for set modification plates. Adequate space shall be provided to accommodate the information arrangement necessary to suit the special characteristics. Standard dimensions for identification plates shall be indicated by size numbers as specified (see 6.1).

Table I - Standard dimensions, identification plates.

Size number	Length	Width	Diameter of holes	Number of holes	Hole center to edge	Hole center spacing	
						Length	Width
	Inches	Inches	Inch		Inch	Inches	Inches
1	2	3/4	1/8	2	1/8	1-3/4	-----
3	2	2	1/8	4	1/8	1-3/4	1-3/4
4	3	1	1/8	2	1/8	2-3/4	-----
5	3	2	1/8	4	1/8	2-3/4	1-3/4
6	3	3	1/8	4	1/8	2-3/4	2-3/4
7	4	1-1/2	1/8	2	1/8	3-3/4	-----
8	4	2	1/8	4	1/8	3-3/4	1-3/4
9	4	3	1/8	4	1/8	3-3/4	2-3/4
10	4	4	1/8	4	3/16	3-5/8	3-5/8
12	5	3	5/32	4	3/16	4-5/8	2-5/8
14	5	5	5/32	4	3/16	4-5/8	4-5/8
17	6	4	5/32	4	3/16	5-5/8	3-5/8
19	6	6	5/32	4	3/16	5-5/8	5-5/8
21	7	3	5/32	4	3/16	6-5/8	2-5/8
23	7	5	5/32	4	3/16	6-5/8	4-5/8
25	7	7	5/32	4	3/16	6-5/8	6-5/8

3.6.2 Information plate dimensions shall be submitted by the contractor to the bureau or agency concerned for approval.

3.7 Detail features. -

3.7.1 Type A (etched). -

3.7.1.1 Material. - Type A plates shall be one of the following materials:

- (a) Corrosion-resisting steel.
- (b) Nickel-copper alloy.
- (c) Aluminum alloy.
- (d) Brass.

3.7.1.2 Marking. - Letters, numerals, other characters or background shall be etched. Additional information, if necessary, may be stamped on the plate.

3.7.1.3 Dimensions. - Etched letters, numerals, other characters or background shall not be less than 0.003 inch deep. Stampings of additional information shall not be less than 0.003 inch deep. The minimum thickness of type A plates shall be 0.03 inch.

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3.7.2 Type B (engraved). -

3.7.2.1 Materials. - Type B plates shall be of one of the materials specified in 3.7.1.1 or of plastic material conforming to type NDP of Specification MIL-P-78 or Specification MIL-P-15037. Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

3.7.2.2 Marking. - Letters, numerals, and other characters shall be engraved. Additional information if necessary may be stamped on the plate.

3.7.2.3 Dimensions. - The depth of engraving and thickness shall be as specified in table II. Stampings of additional information shall not be less than 0.003 inch deep.

Table II - Depth of engraving and thickness of plate.

Plate material	Minimum depth of engraving	Minimum thickness
	Inch	Inch
Plastic	0.003	0.0625
Brass or aluminum alloy	.003	.03
Nickel-copper alloy	.003	.03
Corrosion-resisting steel	.003	.03

3.7.3 Type C (stamped). -

3.7.3.1 Materials. - Type C plates shall be of one of the following materials:

- (a) Brass.
- (b) Nickel-copper alloy.
- (c) Corrosion-resisting steel.

3.7.3.2 Marking. - Letters, numerals, and other characters shall be stamped on the plate. Embossing or relief stamping will not be acceptable.

3.7.3.3 Dimensions. - Stamping shall not be less than 0.003 inch deep. Thickness of type C plates used shall be in accordance with 8.7.1.3.

3.7.4 Type D (cast). -

3.7.4.1 Materials. - Type D plates shall be of cast brass or bronze of commercial quality.

3.7.4.2 Marking. - Letters, numerals, and other characters shall be raised above the body of the plate and shall be polished, the balance of the plate to have a roughened or stippled finish. Additional information, if necessary, may be stamped on the plate.

3.7.4.3 Dimensions. - Letters, numerals, and other characters shall be raised to 0.03 inch. Thickness of type D plates shall be as specified (see 6.1).

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3.7.5 Type E (stenciled). -

3.7.5.1 Material. - Type E plates shall be of plastic material conforming to type HSP of Specification MIL-P-78 or Specification MIL-P-15037. Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

3.7.5.2 Marking. - Letters, numerals, and other characters shall be stenciled on the plate. Marking shall be applied by lithographing, by the silk screen method (method of printing through a stencil that is bonded to a silk screen) or a similar process.

3.7.5.3 Dimensions. - Minimum thickness of type E plates shall be 0.0625 inch.

3.7.6 Type F (laminated). -

3.7.6.1 Material. - Type F plates shall be of plastic material, type GCP-H of Specification MIL-P-78. Other types of plastic material for a specific purpose may be used upon the approval of the bureau or agency concerned.

3.7.6.2 Marking. - The printed information shall be included between the laminations and shall be clearly legible through a transparent outer layer.

3.7.6.3 Dimensions. - Minimum thickness of type F plates shall be 0.0625 inch.

3.7.7 Type G (decalcomanias or "adhesive-backed metal foil"). -

3.7.7.1 General. - Decalcomanias or adhesive-backed metal foil plates shall be mounted on major units normally considered expendable and which do not require permanent marking information to withstand the environmental conditions or the major unit or set. In general, unless otherwise specified in the contract or order, type G plates shall be used to indicate the information necessary for delivery, handling, preliminary or final installation or operation of the major unit or set. They may also be used upon specific approval of the bureau or agency concerned on major units or sets subject to radioactive contamination, or where it is considered impractical to drill mounting holes.

3.7.7.2 Materials. - Decalcomanias shall comply with Specification MIL-D-8834. Adhesive-backed metal foil shall be as approved by the bureau or agency concerned. Materials shall depend upon the type of material, surface finish, and exposure of the item to which the decalcomania or adhesive backed metal foil will be affixed.

3.7.7.3 Marking. - Letters, numerals, and other characters shall be of the open letter design or solid letter design. The open letter design shall have the background omitted and the solid letter design shall have the letters, numerals, and other characters integral with the background. Additional markings may be rubber-stamped or lettered directly on the decalcomania or adhesive-backed metal foil plate before mounting.

3.7.7.4 Dimensions. - Thickness of type G plates shall depend upon the material and the expected life endurance of the decalcomania necessary for the delivery, handling, preliminary, or final installation, and operation of the item to which the decalcomania or adhesive-backed metal foil plate will be affixed.

3.7.7.5 Mounting. - Decalcomanias or adhesive-backed metal foil plates shall be designed for mounting on metallic, phenolic, or organic surface finishes. Mounting shall be in accordance with standard application procedures specified by the manufacturer and approved by the bureau or agency concerned. Properly applied decalcomanias or adhesive backed metal foil shall be firmly adhered and free of bubbles or loose edges. Should a transfer be damaged beyond usefulness after its application, a second transfer may be applied directly over the first transfer.

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3.7.8 Type H (photographic). -

3.7.8.1 Materials. - Type H plates shall be of one of the following materials depending upon the photographic process used:

- (a) Corrosion-resisting steel.
- (b) Aluminum.
- (c) Plastic (fiber glass cloth reinforced polyester laminate)..

3.7.8.2 Marking. - Letters, numerals, and other characters shall be integrated into the plate by a photographic process approved by the bureau or agency concerned and as specified (see 6.1). Stamping of additional marking information will not normally be permitted on metal plates. Plates with plastic backing may be revised by hand engraving through the coating.

3.7.8.3 Dimensions. - Thickness of type H plates shall be as specified in table III.

Table III - Thickness of type H plates.

Plate material	Minimum thickness
	Inch
Corrosion-resisting steel	0.0156
Aluminum	.02
Plastic	.015

3.7.9 Type I (embossed). -

3.7.9.1 Materials. - Type I plates shall be of the following materials:

- (a) Brass.
- (b) Nickel-copper alloy.
- (c) Corrosion-resistant steel.
- (d) Aluminum.

3.7.9.2 Marking. - Letters, numerals, and other characters shall be embossed on the plate by use of an electro-type machine.

3.7.9.3 Dimensions. - The depth of embossing shall be not less than 0.003 inch deep. The minimum thickness of type I plates shall be 0.03 inch.

3.8 Workmanship. - Identification plates and information plates shall be furnished with smooth edges and shall be free from sharp corners. Unless otherwise specified in the contract or order, identification plates and information plates shall be suitable for mounting on finished major units or sets.

4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection and tests shall be conducted to determine that the material employed is in accordance with the requirements of the applicable material specification. Inspection and tests shall also be conducted to determine that the letters, numerals, and other characters are of the specified height on cast identification plates or, are stamped, etched, embossed or engraved to the depth required. In determining the depth of stamping, etching, engraving or embossing, care shall be exercised to insure that all filling material is removed. Surface inspection shall also be conducted to insure that

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the identification plates and information plates furnished comply with the requirements of the contract or order regarding dimensions, thickness, format, life endurance, and finish. No chemical analysis will be required for brass or bronze plates. Plates necessary for proper inspection shall be furnished in addition to those required by the contract or order and without charge to the Government. One production run sample of each type of identification plate or information plate being supplied on the contract or order shall be furnished for inspection. At the request of the bureau or agency concerned, the contractor shall furnish a photographic print of each type of identification plate or information plate being supplied in lieu of a production run sample.

4.2 Inspection procedures. - For Naval purchases, the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking requirements are not applicable to this specification.

6. NOTES

6.1 Ordering data. - Procurement documents for the basic equipment concerned should specify the following:

- (a) Title, number, and date of this specification.
- (b) Whether an identification or information plate is required and the type (see 1.2).
- (c) Weight (see 3.2.2).
- (d) Color of filler for metal plates (see 3.3.4.1).
- (e) Material required (see 3.5.1).
- (f) Color of cores and cover sheets (see 3.5.1.2).
- (g) Size number (see 3.6.1).
- (h) Thickness of type D plates (see 3.7.4.3).
- (i) Photographic process for type H plates (see 3.7.8.2).

6.1.1 Procurement documents for turbines and gears need specify only title, number, and date of this specification.

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:
Navy - Bureau of Ships

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The diagram shows a rectangular label with dimensions 'Length' and 'Width' indicated. The label contains the following text:

TACHOMETER TYPE

SERIAL NO.

STD NAVY STOCK NO.

MANUFACTURED BY

CONTRACT NO.

U.S.

Special characteristics if necessary

DATA HERE OR BELOW

Special characteristics

Rounded corners (1/16 Rad. min)

NOTE: Items such as stock number and serial number may be omitted if not required by the procuring activity.

54 126

Figure L - Basic arrangement.

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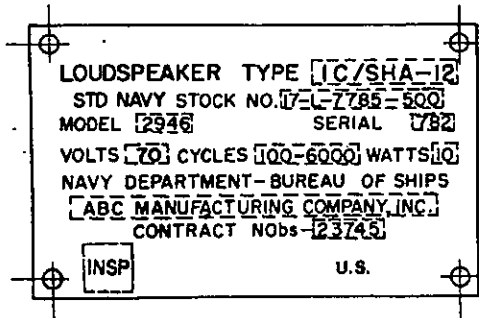


Figure 2 A.- Typical unit.

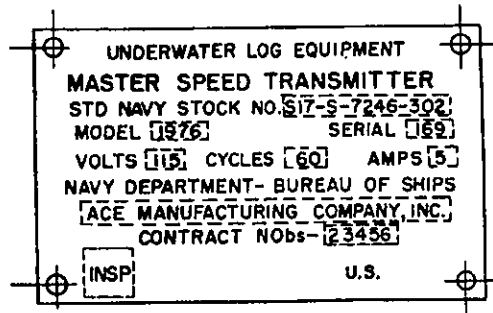


Figure 2 B.- Typical set.

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Figure 2.- Typical identification plates for electrical equipment.

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FIGURE 3.-ILLUSTRATIONS OF IDENTIFICATION PLATES FOR ELECTRONIC EQUIPMENT.

NOTE: Dimensions and other information on illustrations show typical proportions and spacing. The square is the space for inspector's stamp.

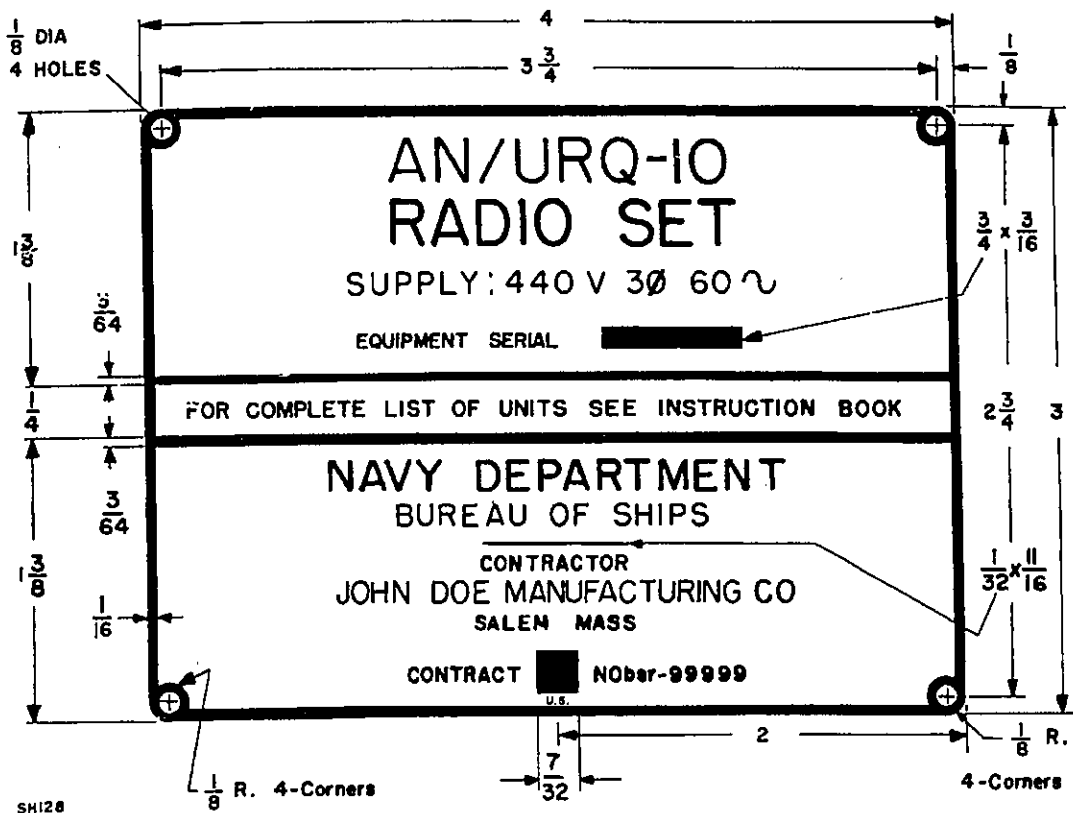


Figure 3A.- Set.

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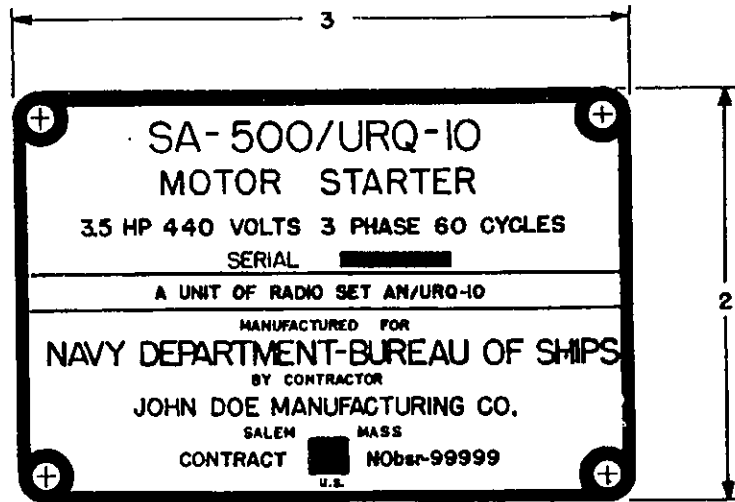
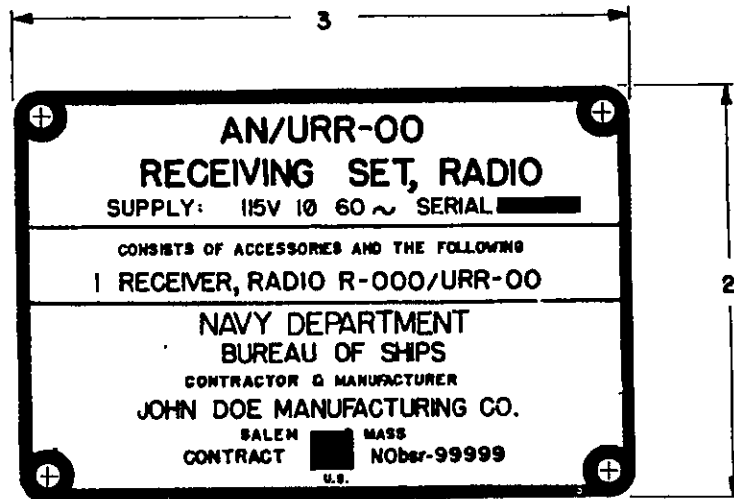


Figure 3B.-Unit



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Figure 3C.-Combination Set and Unit

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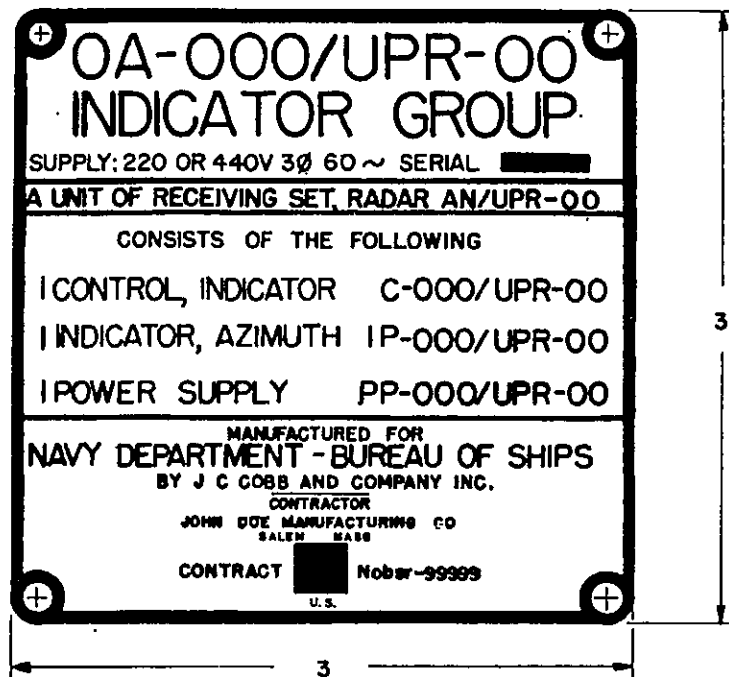
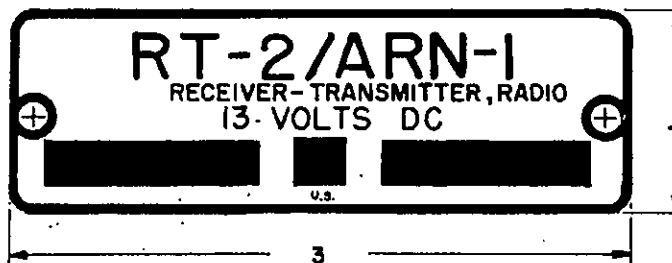


Figure 3D.-Group.



SH130A Figure 3E.- Unit. (For limited space and airborne equipment).

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MODIFIED TO RADIO SET AN/SRC-00
BY ADDITION OF FIELD CHANGE #00
UNDER CONTRACT NO 68-00000

Figure 3F.- Modification plate.

NOTE: The length of the modification plate shall be the same as that of the plate in whose vicinity the modification plate will be used.

GENERATOR SET, TURBINE

SERIAL NO. []

STD. GOVT STOCK NO. []

MANUFACTURED BY

[]

[] INSP [] CONTRACT NO. []

TURBINE DATA

MODEL [] RPM []

STEAM, PSIG [] VACUUM HG []

STEAM TEMP []

GENERATOR DATA

MFR [] MODEL [] RPM []

KW [] VOLTS [] AC or DC []

U.S.

94131

Figure 4A.—Typical generator set.

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MAIN REDUCTION GEAR		DOUBLE REDUCTION	
SERIAL NO. []		REVERSE TYPE []	
STD. NAVY STOCK NO. []		STD. NAVY STOCK NO. []	
MANUFACTURED BY []		MANUFACTURED BY []	
CONTRACT NO. []		CONTRACT NO. []	
UNIT []		UNIT []	
HP PINION	1ST. RED.	RPM	SHIP
LP PINION	1ST. RED.		
MAIN GEAR	2ND. RED.		
U.S.		U.S.	
THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY			

MAIN REDUCTION GEAR		SINGLE REDUCTION	
SERIAL NO. []		SERIAL NO. []	
STD. NAVY STOCK NO. []		STD. NAVY STOCK NO. []	
MANUFACTURED BY []		MANUFACTURED BY []	
CONTRACT NO. []		CONTRACT NO. []	
UNIT []		UNIT []	
PINION GEAR		RPM	SHIP
U.S.		U.S.	
THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY			

REDUCTION GEAR		NAME OF EQUIPMENT USED IN	
SERIAL NO. []		SERIAL NO. []	
MANUFACTURED BY []		MANUFACTURED BY []	
CONTRACT NO. []		CONTRACT NO. []	
UNIT []		UNIT []	
MAX RATED		RPM	SHIP
PINION			
GEAR			
U.S.		U.S.	

SH132

Figure 4B.—Typical reduction gears.

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IDENTIFICATION PLATE FOR COMBINED LP AND ASTERN TURBINE

MAIN TURBINE UNIT []	
SERIAL NO. []	
STD. NAVY STOCK NO. []	
MANUFACTURED BY []	
CONTRACT NO. []	
INSP []	
AHEAD SHP ASTERN ELEMENT	
TURBINE RPM []	
INLET PSIG [] OVERSPEED RPM []	
INLET TEMP °F [] EXH PRESS. ABS []	
U.S.	

THIS SPACE FOR LIFT WEIGHTS ONLY

IDENTIFICATION PLATE FOR AUXILIARY TURBINE

TURBINE []	
NAME OF EQUIPMENT TO BE USED IN []	
SERIAL NO. []	
STD. NAVY STOCK NO. []	
MANUFACTURED BY []	
CONTRACT NO. []	
INSP []	
TYPE [] OVERSPEED RPM []	
MAX RATED RPM [] INLET PSIG []	
MAX RATED SHP [] INLET TEMP °F []	
EXH PRESS []	
RELIEF VALVE SETTING []	
BACK PRESS TRIP SETTING []	
OVERSPEED TRIP SETTING []	
U.S.	

IDENTIFICATION PLATE FOR CRUISING, HP AND HP-IP TURBINE

MAIN TURBINE UNIT []	
SERIAL NO. []	
STD. NAVY STOCK NO. []	
MANUFACTURED BY []	
CONTRACT NO. []	
INSP []	
TURBINE SHP [] INLET PSIG []	
TURBINE RPM [] INLET TEMP °F []	
OVERSPEED RPM [] EXH PRESS. PSIG []	
U.S.	

THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY

IDENTIFICATION PLATE FOR SINGLE CASING (GEARED OR ELECTRIC DRIVE) TURBINE

MAIN TURBINE UNIT []	
SERIAL NO. []	
STD. NAVY STOCK NO. []	
MANUFACTURED BY []	
CONTRACT NO. []	
INSP []	
TURBINE SHP [] INLET PSIG []	
TURBINE RPM [] INLET TEMP °F []	
OVERSPEED RPM [] EXH PRESS. ABS []	
U.S.	

THIS SPACE FOR ENTERING LIFT WEIGHTS ONLY

SH66A

NOTE:

- (1) All terminal conditions stamped on identification plates are for design full power, except for values of the separate cruising turbine which shall be for maximum cruising condition.
- (2) Each pressure stamped on an identification plate must, unless already apparent on plate, indicate the unit of pressure and whether-or-not value stamped is absolute, i. e. 25 in. hg., 10 p. s. i. g., etc.

Figure 4C - Typical turbines.

MIL-P-15024B(SHIPS)

CONDENSER		TYPE []	
SERIAL NO. []			
STD. NAVY STOCK NO. []			
MANUFACTURED BY []			
CONTRACT NO. []			
[] INSP	HYDROSTATIC TEST PRESSURE, SHELL AND WATER BOXES [] PSIG		[] UNIT
SHELL AFTER TUBING [] PSIG			
TUBE MATERIAL []		NUMBER OF PASSES []	
WATER VELOCITY [] FT/SEC		AT [] GPM	
COOLING SURFACE [] SQ. FT.			
U.S.			

REFRIGERATING CONDENSER			
SERIAL NO. []			
STD. NAVY STOCK NO. []			
MANUFACTURED BY []			
[] INSP	CONTRACT NO. []		
[] REFRIGERANT			
CONDENSING SIDE		WATER SIDE	
TEST PRESS. [] PSIG	TEST PRESS. [] PSIG		
SHELL DIA. []	TUBE LENGTH []	NO. PASSES []	
WATER VELOCITY [] FT/SEC		AT [] GPM	
COOLING SURFACE [] SQ. FT.			
U.S.			

Note: Identification plates shall be soft soldered to tank or receiver.

SHI34

Figure 4 E.—Typical condensers.

MIL-P-15024B(SHIPS)

COMPRESSOR [] SERVICE		
SERIAL NO. []		
STD. NAVY STOCK NO. []		
MANUFACTURED BY []		
[] INSP	CONTRACT NO. []	
TYPE []	BORE []	STROKE []
NO. CYL. []	RPM []	
CAP. []	BTU/HR AT []°F SUCT AND	
[]°F CONDENSING TEMPERATURE		
TEST PRESSURE [] PSIG		
WORKING PRESSURE [] PSIG		
U.S.		

Figure 4F.—Typical compressor.

TANK OR RECEIVER, TYPE []	
SERIAL NO. []	
STD. NAVY STOCK NO. []	
MANUFACTURED BY []	
[] INSP	CONTRACT NO. []
HYDROSTATIC TEST PRESS. [] PSIG	
CAPACITY []	
SHELL DIA. []	LENGTH []
U.S.	

Note: Identification plate shall be
soft soldered to tank or receiver.

SH135

Figure 4G.—Typical tank or receiver.

MIL-P-15024B(SHIPS)

INT. COMB. ENGINE		TYPE	
SERIAL NO. [] [] [] []		[] [] [] []	
STD. NAVY STOCK NO. [] [] [] []		[] [] [] []	
MANUFACTURED BY			
[] [] [] [] [] [] [] []			
CONTRACT NO. [] [] [] []		[] [] [] []	
MODEL NO. [] [] [] []	HAND		[] [] [] []
RPM [] [] [] []	ROTATION		[] [] [] []
BHP [] [] [] []	BORE & STROKE		[] [] [] []
U.S.			

Figure 4 H.—Typical diesel engine.

FORCED DRAFT BLOWER	
SERIAL NO. [] [] [] []	
STD. NAVY STOCK NO. [] [] [] []	
MANUFACTURED BY	
[] [] [] [] [] [] [] []	
CONTRACT NO. [] [] [] []	
PSIG [] []	EXH PRESS. [] []
°F TEMP [] []	BHP [] []
TYPE [] []	SIZE [] []
RELIEF VALVE SETTING [] [] [] []	
OPERATING CONDITIONS	
MAXIMUM	NORMAL
CAP. [] [] CFM	CAP. [] [] CFM
[] [] RPM	[] [] RPM
SP. [] [] IN. WATER	SP. [] [] IN. WATER
OVERSPEED TEST [] [] RPM	
U.S.	

SH 136

Figure 4 J.—Typical forced draft blower.

MIL-P-15024E(SHIFS)

LUB. OIL COOLER		TYPE []	
MFRS. SERVICE PART NO. []			
STD. NAVY STOCK NO. []			
MANUFACTURED BY []			
CONTR. NO. []			
DATE MFO []		SERIAL NO. []	
[]			
MAX. TEST PRESSURES PSIG		UNIT	
SHELL SIDE []		TUBE SIDE []	
U.S.			

THIS SPACE FOR NUMBERING BY
SHIPYARD WHEN REQUIRED

Figure 4K.—Typical cooler or heater. To be used for lub. oil coolers, heaters, fresh water coolers, fuel oil heaters, coolers.

NAVY DEPT.-BUREAU OF SHIPS			
CONTRACT NO. []		COST []	
YEAR []		MANUFACTURER []	
[]			
SERIAL NO. []		MODEL []	
STD. COM. CLASS. NO. []			
NAVY ID. NO. []			
NOMINAL CAPACITY []			
VOLTAGE []		PHASE []	
		CYCLE []	

SH 137

Figure 5.—Typical machine tools and Industrial Shop Equipment.

Exhibit N

SL-1

GENERAL SPECIFICATIONS FOR MACHINERY

Bureau of Ships, Navy Department

SUBSECTION SL-1. PLANS

1 November 1940

(Superseding Subsection SL-1, Plans, dated September 1, 1938)

NOTE:- Plans for the machinery, electrical equipment, and accessories of vessels building for the Navy are always of a confidential nature. Care shall be observed that they do not fall into the hands of unauthorized persons, especially those not citizens of the United States.

The following is quoted from an act approved June 15, 1917:

" * * * whoever, lawfully or unlawfully, having possession of, access to, control over, or being intrusted with any document, writing, code book, signal book, sketch, photograph, photographic negative, blueprint, plan, map, model, instrument, appliance, or note relating to the national defense, willfully communicates or transmits or attempts to communicate or transmit the same to any person not entitled to receive it, or willfully retains the same and fails to deliver it on demand to the officer or employee of the United States entitled to receive it; or whoever, being intrusted with or having lawful possession or control of any document, writing, code book, signal book, sketch, photograph, photographic negative, blueprint, plan, map, model, note, or information, relating to the national defense; through gross negligence permits the same to be removed from its proper place of custody or delivered to anyone in violation of his trust, or to be lost, stolen, abstracted, or destroyed, shall be punishable by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. * * * "

SL-1-a. General requirements.

- References: (a) Navy Department Specification 42B9 - Boxes, spare part, electrical and mechanical (shipboard use).
 (b) Federal Specification CCC-C-531, Tracing Cloth.
 (c) List of Bureau standard plans, see Appendix I.

1. All drawings of machinery and accessories under the cognizance of the Bureau of Ships, which shall be furnished by and at the expense of the contractor, are grouped under the following general classification:

- (a) Type A drawings - Preliminary drawings, submitted with bids or prior to award of contract.
- (b) Type B drawings - Development or working drawings; submitted for approval subsequent to award of contract but prior to ordering material or commencing work.

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- (c) Type C drawings - Drawings prepared during the progress of work to accompany orders on sub-contractors, particularly orders for steel castings and forgings.
- (d) Type D drawings - Finished drawings, submitted after work is completed.
- (e) In addition to the foregoing, instruction books and pamphlets, plans, and data incorporated in Booklet Plans of Machinery and Record of Electrical Installation shall be supplied as herein-after described.

2. The Bureau's approval of any type of plan shall not relieve a contractor of any material or performance obligation under the contract, unless a question in regard thereto has been brought to the Bureau's attention in writing, and specific waiver of such requirement by the Bureau has been obtained, see section A1. All discrepancies discovered in drawings, in specifications, or between drawings and specifications, shall be immediately referred to the Bureau for action.

3. Drawings need not necessarily be made to scale, but, where practicable, scaled drawings are preferred. When drawings are not made to scale, such facts shall be clearly stated in the drawing title. In all cases figured dimensions of all parts shall be complete and shall include manufacturing tolerances, working fits, and surface finish, wherever applicable. All dimensions shall be given in feet, inches, and decimals or fractions of inches. Dimensions which apply to fitted parts shall be given in inches and fractions of inches with tolerances in decimal fractions; dimensions of non-fitted parts may be given in inches and decimal or common fractions; dimensions greater than 24 inches may be given in feet, inches, and fractions thereof. Where drawings are made to scale one of the following standard scales shall be used.

- 1/16-inch to the foot.
- 1/8-inch to the foot.
- 1/4-inch to the foot.
- 3/8-inch to the foot.
- 1/2-inch to the foot.
- 3/4-inch to the foot.
- 1-inch to the foot.
- 1-1/2-inches to the foot.
- 3-inches to the foot.
- 6-inches to the foot.
- Full size.

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4. The following plans shall be drawn to scales as indicated, but larger scales are preferred when their employment will not unduly increase the dimension of the sheet:

- (a) General layout plans of machinery installations of not less than one-quarter inch to the foot.
- (b) Piping layout plans for machinery spaces not less than three-eighths inch to the foot.
- (c) Electrical wiring layout plans for the entire vessel shall be made with decks and other structural features drawn to a scale of not less than one-quarter inch to the foot.

5. All dimensions shall be so placed on drawings that they may be read either from the bottom of the sheet or from the right-hand side.

6. Salient features of the design and performance characteristics of all apparatus shall be prominently shown on every drawing where applicable. Such features shall include:-

- (a) Power input.- Pounds of steam per hour, kilowatts per hour, pounds of oil per hour, etc.
- (b) Power output (normal rated and overload).- Horsepower, kilowatts, gallons per minute, etc.
- (c) Pressures.- Steam, exhaust, suction, discharge, test, bearing, voltage, etc.
- (d) Speed.- Revolution or double strokes per minute, feet per second, bearing or journal surface speed, etc.
- (e) Velocity (steam, liquid, air, gas).- Through pipes and orifices, peripheral, etc.
- (f) Temperature (inlet and outlet).- Steam, superheat, liquids, etc.
- (g) Surfaces (area of).- Heating, cooling, grate, etc.
- (h) Viscosities of liquids handled with corresponding temperatures.
- (i) Power losses.- In same units as (a) and (b).
- (j) Heat transfer.- Coefficient or rate.
- (k) Piping.- Friction head on suction at rated flow, pressure drop through.
- (l) Boilers.- Furnace volume, clear area through gas passages, uptakes, armor bars, gratings, etc.
- (m) Blowers.- Clear area through ducts, intake gratings, armor bars, etc.
- (n) Weights.- As a whole or per unit, computed or actual, wet and dry.
- (o) Power characteristics.- Voltage, frequencies, number of phases, type of windings, starting torque, full-load speed, torque, percentage of slip, speed adjustment, duty classification, etc.
- (p) Characteristic curves.- Steam consumption, horsepower, head, pressure, capacities, speed, efficiencies, etc.

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7. Where parts of machinery are indicated as being right-hand or left-hand, a note shall be added to the drawing explaining in detail the difference between the right-hand and left-hand parts. Drawings of screw propellers, in addition to diameter, pitch, developed and projected areas of blades, etc., shall show indicated or shaft horsepower, effective horsepower, revolutions, and speed of vessel for which the propeller has been designed. Drawings of valves and miscellaneous fittings shall show the number, material, and location of each type and size. All drawings of apparatus using tubes, such as boilers, condensers, superheaters, feed-water heaters, etc., shall include a table showing number, ordering length, diameter, thickness, material, etc., of each type and size of tube required; the same applies to special brick in boiler combustion spaces. All apparatus using electric cable or wire shall include a table giving length, size, and type of all cable used.

8. Indicating the materials of construction by distinctive crosshatching is not required on any class of drawing; simple line hatching of complete sections or borders of separate parts shall be used wherever necessary to indicate a junction of two different pieces or otherwise to completely clarify the drawing. When distinctive crosshatching is used it shall conform to Bureau of Ships standard B-20.

9. The materials of construction shall be indicated on a list of material in all cases whether distinctive crosshatching is used or not, and this list shall appear in the upper right-hand corner of a drawing sheet, extending to the left, and down as necessary. Since, under the provisions of Subsection S1-2, the list of material becomes the medium of agreement between the Bureau and the contractor as to the materials to be employed in construction, it is very important that extreme care be exercised in proper preparation. In order to facilitate Bureau action the following arrangement shall be followed (see also Table I):

- Column 1 - The piece number. (in numerical sequence, 1, 2, 3, etc.)
- Column 2 - The name of piece.
- Column 3 - The number required.
- Column 4 - The material.
- Column 5 - The specification.

10. In the specification column the Navy Department specification and Supplementary General Specifications for Machinery number and class applicable shall always appear for each item considered by the manufacturer to fall in the stressed or otherwise vital class, and so subject to full inspection. Suffix letters, such as the "a" in 43B11a and SGS(41)-37a are not required to identify the particular issue of Navy Department specifications and Supplementary General Specifications for Machinery. The identifying number only, "43B11" or "SGS(41)-37" is necessary. In cases where the manufacturer proposes a substitution, reference to a footnote shall be entered after the Navy Department specification or Supplementary General Specification for Machinery number, and in the footnote the substitution shall be described in sufficient detail as to analyses, tests, heat treatments, etc., as will permit

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the Bureau to take proper action without further correspondence and in such form that proper inspection can be made. No entry shall be made in column 5 either of specification number or other designation, where the material is nonstressed or nonessential in character. The Bureau, in acting on the plan, will either accept or return this list of material for revision, and having been agreed upon, and approved, the specification column with its footnotes shall serve as the inspecting officer's guide as to whether a full or only a surface inspection shall be applied, see Subsection SL-2. Additional columns will be permitted in the list of material to suit the special requirements of a contractor, but there shall be no omissions from the information called for. Table I is a typical list of material for drawings and should be followed in carrying out the foregoing instructions. The width of columns and spacing of lines may be increased over that shown to suit requirements.

11. In order to reduce the number of plans for certain classes of material, such as electrical equipment, switchboards, searchlights, and similar apparatus which are made up of parts and subassemblies that are identical except for minor details or in numbers of parts, additional columns may be inserted to the left of column 1. The number required of the items in column 2 (name of piece) shall be tabulated in these additional columns instead of in column 3. This procedure is ordinarily applicable to plans which have been approved previously for similar apparatus on other vessels and may be used for assembly drawings, sub-assemblies, or detail parts. Essentially each item in column 2 is identified by means of the additional columns. If an item in column 2 does not apply to the latest design, the space opposite that item in the additional column shall be left blank. If a part is changed, a new item shall be added to column 2 and the number required of the new item shall be indicated in the additional column. If the number required of any items is changed the new number required will appear in the additional column. Each additional column shall show all the items that go to make up the complete unit corresponding to that column. These items may be sub-assemblies or individual parts, depending on the character of the unit. Plans must be complete, permit ready identification of any part, show all details required for duplication of parts and include all parts which go to make up the complete assembly. An explanatory note shall be added to each plan embodying this procedure that will show clearly which additional columns apply to the particular assembly, sub-assembly, or detail part on the plan, and the complete unit shall be identified by name-plate serial numbers or other positive means.

12. Surface finish shall be indicated for all parts. Where practicable, Bureau standard symbols and method of indicating them shall be used as described below: where the shop practice of a given manufacturer requires symbols differing from the Bureau's standard, the manufacturer's symbols will be acceptable.

Finish Surface Marks

- | | | |
|-------------------------|--------------|-----------------|
| f 1. Rough tool finish. | f 4. Polish. | f 7. File. |
| f 2. Fine tool finish. | f 5. Drill. | f 8. Scrape. |
| f 3. Grind. | f 6. Ream. | f 9. Spot face. |

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13. Each piece will be marked with the character of finish required by inserting the corresponding number in the circle, the arrow being placed against the surface to which the finish mark applies. See figure 1.

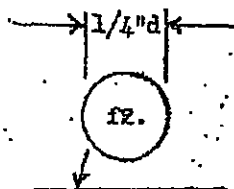


Figure 1

14. The right-hand side of types B and D drawings shall be reserved for titles, list of material, explanatory notes, etc., and type B and D drawings shall conform to the Bureau's standard title block plan No. 385691 for arrangement.

15. The titles of all drawings shall be complete, and for all drawings, except type A, shall be preceded by the official designation of all vessels to which the drawing applies, as obtained from the special specifications therefor or from the Bureau; viz, BB45, DD240, etc. As soon as the vessels are named, the name of each vessel shall be added to its official designation wherever it appears. Names and designations of vessels shall be placed on drawings in letters not less than one-fourth inch high.

16. Each type D assembly drawing of a set for a given item of apparatus or equipment shall carry a drawing list or index showing all other drawings of the set with identification numbers for ready reference.

17. Where welding is to be used, types A, B, and D drawings shall show welding details clearly and concisely in all important and highly stressed members. For general indications in structural assemblies, the welding symbols of section A-2 of Appendix VII of the General Specifications for Inspection of Material shall be used; in all such cases, a key to the welding symbols shall be included on the drawing.

18. It is of the utmost importance that the details of the spare parts and special tools to be furnished under any requisition, contract or order be clearly shown on both Type B and D drawings. The details of spare parts and special tools for electrical equipment shall be arranged in a list in conformity with the 'List of Spare Parts and Tools' shown on Navy Department specification 42B9. In general, a detailed list of spare parts and special tools to be furnished per vessel, and/or per requisition, contract or order, shall be shown on the general assembly drawing for the equipment in question; in cases where such a list would be too extensive for detailing on the assembly drawing, a separate drawing shall be prepared for this sole purpose. For convenience of the manufacturer, the Bureau will accept a modification of the list of material shown under the preceding sub-paragraph 10, whereby the columns headed "Number required" may be broken down into two columns, one showing number required for assembly purposes and one showing additional parts to be manufactured for spares; but such information on detail plans shall not relieve the contractor from the responsibility for furnishing a detailed summary of spare parts and special tools on the general

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assembly drawing or separate special drawing, as the case may require. Final Bureau approval of the spare parts and special tools will be given on the assembly drawing, or special drawing, in each case, and not on detailed drawings. In particular, when sets of spare parts for a particular equipment are called for by the requisition, contract or purchase order, such as "complete sets of bearings," the summary of spare parts shall show in detail what items constitute a set.

19. In all applications of antifriction bearings of ball or roller types, the assembly plan of the apparatus shall bear a certificate signed by a responsible representative of the bearing manufacturing company showing that the application of each particular bearing proposed for use is approved by his company as to all details of mounting shown, the load and speed to which the bearing will be subjected and the lubrication of the bearing, giving full consideration to the intended service, viz, continuous or intermittent, ambient temperature, disassembly requirements, etc.

SI-1-b. Photographic tracings.

1. Photographic tracing shall be furnished on tracing cloth which is in accordance with Federal Specifications CGC-G-531; white cloth vellum is not acceptable. Photographic tracings shall be right reading and capable of producing a clear and distinct print, and there shall be no distortion nor illegibility of the lines or figured dimensions.

2. Photographic tracings shall be made by an approved photographic process which shall consist of the production of a suitable vandyke negative from the original tracing on special paper; the negative shall then be placed on sensitized tracing cloth and exposed. Following exposure, the tracing cloth shall be passed through a water bath and a developing solution and then carefully wiped clean with cotton or a camels-hair brush to remove foreign or excess substances on the surface.

3. Photographic tracings shall be made with clear, sharp, durable black lines on the dull side of tracing cloth which has been treated with a colorless waterproof coating and sensitized to produce a black line print when exposed under a negative, developed and washed. They shall be of such character as to permit erasures and making alterations in ink with the same facility and degree of permanency as with regular ink tracings. The waterproofing shall withstand at least 20 minutes exposure to water without showing any tendency to break down and shall withstand a sufficient amount of vigorous rubbing necessary to clean out the back ground without disturbing the lines; breaks, cracks, or spots in waterproofing shall be cause for rejection. The waterproof coat shall adhere to the cloth so that it cannot be stripped from the cloth on either side.

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4. The surface of photographic tracings shall be dull mat finish, requiring no top coating or lacquer, and shall possess sufficient tooth to take india ink with the same freedom as natural tracing cloth, and without causing the pen to slip or skip or the ink to spread unduly. The finish shall permit india-ink lines to sufficiently penetrate the surface of the cloth so as to resist removal by chafing with the thumb nail, smudging the lines by damp hands under pressure and the wear and tear of frequent handling. Failure to withstand the above shall be cause for rejection.

5. Photographic tracings shall be perfectly smooth and flat when unrolled and show no tendency to pucker or draw. The background of the cloth after printing and developing shall be of a bluish-white tint having a transparency ratio of not less than 65, and the cloth shall retain as nearly as possible the flexibility of natural tracing cloth. Thickness over 0.0043-inch, stiffness or tackiness shall be cause for rejection.

6. All tracings from which photographic tracings are made shall be in such condition as to produce photographic tracings which are satisfactory in every respect.

SI-1-c. Sizes of drawings.

1. The standard vertical dimension when reading all drawings except types A and C drawings, shall be 27-inches, and the standard length shall be 40-inches, and this standard sheet shall be used whenever practicable. A half size sheet shall be 27-inches in the vertical direction and 20-inches in length, and this size sheet may be used when the standard sheet is not required. If a sheet larger than the standard sheet is essential, the length may be increased as required up to a maximum length of 80-inches. In exceptional cases the vertical dimension may be increased to 40-inches when specifically authorized by the Bureau. For deck arrangements of large vessels and similar plans, where the scale of drawings required to keep within the dimensions of the sheets specified herein, would make the drawing difficult to read, the supervisor of shipbuilding may permit the contractor to exceed the length of 80-inches specified, but the number of such sheets shall be kept at a minimum and specific approval of the supervisor must be obtained in each instance.

2. There is no restriction as to the size of types A and C drawings.

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SI-1-d. Type A drawings.

1. Type A drawings submitted in connection with bids for the building of vessels shall consist of such sketches and plans as may be necessary to amplify the Bureau's original contract plans. Such drawings shall be submitted in duplicate with bids or as required by the invitation for bids.

2. When equipment for vessels is to be purchased directly by the Navy Department, type A drawings in duplicate shall be furnished with the bids, or as may be specifically called for in the requisition or schedule. In any case one set shall be for the files of the Bureau of Ships and the remainder filed as directed by the Bureau of Supplies and Accounts. Type A drawings shall consist of all sketches, cuts, drawings, etc., as may be necessary to show completely the character and design of the material or equipment it is proposed to furnish, and in amplification of the description and guarantees described in the wording of the bid.

3. For apparatus such as turbines, pumps, motors, generators, condensers, boilers, and similar units, sectional plans shall be furnished which show clearly the details of the design, the materials of which the units are to be built, the over-all dimensions, and the space required for operation and overhaul.

4. For equipment such as distilling plants, refrigerating plants, and similar installations a floor-plan arrangement shall be furnished showing the space occupied by the apparatus, the space required for operation and overhaul, and the units which make up the plant. Sectional plans of the principal units containing the information required in the preceding paragraph, and such other information as will permit a clear understanding of the plants and their operation shall be also furnished.

5. Award of contract in connection with which type A plans have been submitted does not carry approval of such type A plans as construction or manufacturing plans but they are subject to modification in the development of type B plans as demanded by the requirements of the specifications and terms of the contract.

SI-1-e. Type B drawings.

1. Type B drawings shall consist of preliminary diagrammatic and detail working plans of all machinery and equipment prepared in the development of the contract specifications and shall be submitted for approval via the Bureau's inspector with suitable letter of transmittal for each vessel covered, as soon after award of contract as possible and before work covered by such plans is commenced. Before detail working plans are submitted diagrammatic plans of general arrangement of main and auxiliary machinery, piping, light, power, and interior communication systems must be approved. These drawings shall be carefully checked in order to correct omissions, errors, deviations from form, and noncompliances with the specifications before submission for approval via the Bureau's inspector. When drawings in an unsatisfactory condition in this respect are forwarded in sufficient quantity to constitute a definite cause for delay, the Bureau's inspector shall report the circumstances to the Bureau together with such comment as the contractor may care to make. As the working plans are

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developed, the shipbuilder shall enter the calculated weights on the plans in accordance with the following general requirements:

- (a) Assembly plans of units and equipment shall have indicated thereon the calculated weight of the assembled unit or piece of equipment. Assembled units of 1,000 lbs. or over shall have the center of gravity indicated. The detail plans of parts forming the assembly shall have notes thereon referring to the assembly plans on which the weights are recorded.
- (b) Piping arrangement plans shall have indicated thereon the calculated weights of the systems. Where applicable, weights of piping systems shall be indicated by subject sub-divisions in accordance with the latest edition of Instructions to Supervisors of Shipbuilding for Recording and Reporting Weights of Finished Machinery.
- (c) Electrical weights for interior communication, fire control, radio, sound, and mine protective systems shall be indicated by circuits and totals for each system. Power and lighting systems need not have weights indicated on the deck plans or feeder lists, but the plans of these systems shall be cross-referenced to a plan covering a summary of the calculated weights for each of these systems.
- (d) The submission of plans for approval shall not be withheld awaiting entry of calculated weights; but these weights shall be determined and entered on the plans as required in the foregoing paragraphs as early as practicable.

2. Type B drawings shall be blueprints furnished in triplicate unless otherwise specified where the equipment covered thereby is entirely under the cognizance of the Bureau of Ships. If other bureaus are involved one additional copy shall be furnished for each of the other bureaus concerned. Of the copies furnished, two shall be retained by the inspector and the remainder shall be forwarded by him to the bureau. Upon receipt of the bureau's action, one of the copies retained by the inspector will be suitably endorsed by him indicating such action and returned to the contractor. Additional copies offered by the contractor will be similarly endorsed on request.

3. Where two or more vessels of the same class are under construction at the works of the same contractor, or where plans are developed by a central drafting room, type B drawings pertaining to equipment common to two or more vessels shall be submitted as for one vessel and the number of blueprints furnished shall be as directed by the bureau. In such case drawings shall show name and designation of all vessels covered and letter of transmittal shall give the same information together with contract number of each vessel.

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4. Type B drawings may be submitted as tracings accompanied by one blueprint for the files of the Bureau of Ships and one for the files of any other bureau concerned. When so submitted the contractor shall furnish the bureau's inspector with one copy for his use, as soon as approved tracing is returned with bureau's approval.

5. Where type B drawings are taken from tracings previously approved by the bureau for other vessels, or are tracings made from approved drawings of other builders a note shall be made of bureau number previously assigned, together with notation "Modified", if modification has been made. If a new drawing is prepared it shall bear a note indicating that it supersedes the previous drawing number.

6. Any alteration made on a type B drawing during the progress of work shall require procedure to obtain approval in the same manner as in the case of the original. Copies of the new or altered drawing, if approval is obtained, shall be supplied as in the case of the original. If alterations are thus authorized and no new drawing is made, the altered drawing shall carry a table of alterations serially numbered and arranged in a table giving date, nature of each alteration, and reference authority for change; such alteration tables shall indicate the character of the original design features which have been altered. The bureau's inspector shall certify approved alterations as in the case of the original drawing.

7. Two blueprint copies on paper of all finally approved type "B" drawings shall be supplied by the contractor with each vessel delivered to take the place of type D drawings, if the complete set of type D drawings is not ready at time of delivery. One set of such blueprints showing the machinery and electrical installations as finally approved shall be delivered to the Commanding Officer of each vessel via the supervisor of shipbuilding, and the other set forwarded via the supervisor to the commandant of each vessel's home navy yard.

8. In the purchase of equipment for vessels directly by the Navy Department, type B drawings shall be furnished for the bureau's action prior to fabrication of any material, unless the contract specifically states otherwise. In such case the method of procedure shall be identical with that outlined above. The drawings shall likewise be forwarded in triplicate with additional copies for each of the other bureaus concerned, unless the contract states otherwise.

Sl-1-f. Type C drawings.

1. Type C drawings shall consist of such drawings as are necessary to amplify information supplied to sub-contractors with orders, copies thereof being required by the bureau inspectors in making inspection at the works of the sub-contractors.

2. Such drawings may be copies of type B plans previously approved or any other form of drawing the contractor may desire to use. Copies of such drawings shall be furnished complete with each copy of the order. All drawings

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shall be clearly marked to show either shipbuilder's order number or Navy contract number to facilitate identification. Orders are required to be submitted to the bureau's inspector in quadruplicate. The bureau's inspector will supply the bureau and other inspectors at the works of sub-contractors with copies as necessary.

3. Orders for steel castings or forgings shall always be accompanied by type C drawings.

SI-1-g. Type D drawings.

1. Type D drawings shall consist of accurate hand tracings in india ink or photographic tracings on tracing cloth for all finished work, and shall be sufficiently extensive in detail to enable parts of the machinery and electrical installation of a vessel to be duplicated without additional drawings, and shall contain sufficient information to permit any part to be readily identified in orders for replacement; for the latter purpose only, photographs mounted on standard size cloth back sheets with part numbers clearly marked thereon will be acceptable to amplify and simplify, but not to replace the regular assembly drawings. (Except as modified under per. SI-1-k.)

2. Assembly drawings shall show the name of all major parts of the apparatus or subassemblies which appear on other plans. All clearances affecting the assembling of detail parts shall be clearly indicated, together with any other information required for the proper adjustment of those parts. Any information, not otherwise furnished in instruction books, pertaining to the operation of the apparatus shall be indicated.

3. Where photographic tracings are supplied, reproductions made from the manufacturer's own shop tracings, will, in general, be acceptable. However, whether photographic tracings are made from shop drawing or otherwise, no finished drawings supplied under these specifications shall show any plan or supply any information that is not strictly applicable to the apparatus or equipment for which the drawings are furnished except for certain classes of equipment which are made up of parts of subassemblies, the details of which can be indicated by the procedure specified in subparagraph SI-1-a-9.

4. For equipment which is required to be in accordance with Navy Department Specifications 17C10, 17C17, 17C7, 17C8, 17M10, and 17M17; the plans shall conform to the requirements specified therein, except that for type D plans, the number of sets, size, arrangements, title, and form shall conform to the requirements specified herein.

5. When a contractor for a given class of equipment is in doubt as to the character of the type D drawings required by the bureau, it is suggested that a representative set of drawings covering a characteristic item of equipment be submitted to the bureau in triplicate for approval. The bureau will then retain one set of such drawings, and return one corrected set to the contractor, and send one corrected set to the bureau's inspector having cognizance, for use in checking drawings delivered on contract.

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6. All type D drawings shall be furnished complete within 4 months after a vessel has been delivered by the contractor unless the contract specifically states otherwise.

7. Where contracts for the construction of two or more vessels of the same design are awarded to one contractor, under contracts for which bids were opened at the same time, original finished tracings or photographic tracings for the bureau and for distribution to Navy Yards are required only as for one vessel, whenever the apparatus covered is identical. If not identical, separate and complete sets of tracings or photographic tracings for the bureau and for navy yards for all items which differ shall be furnished for each vessel so affected. When more than one vessel is covered by a drawing, the designation, name, and contract number for each vessel to which the drawing applies shall appear thereon.

8. Unless otherwise specified, sets of type D drawings shall be furnished in number and for the purpose indicated as follows:

(a) One complete set of hand tracings or photographic tracings for each group of similar vessels on order from the same contractor for the files of the bureau.

(b) Seven complete sets as in (a) above to the bureau's inspector for distribution to navy yards, as directed by the bureau.

(c) One complete set of blueprints for each vessel built containing only the items pertaining to that vessel; this set shall be supplied to the vessel via the supervisor of shipbuilding.

9. The type D drawings furnished for the machinery installation and electrical plant shall be indexed by the shipbuilder. Indexing shall be done with india ink and conform to size and style shown on Bureau of Ships plan 385691 (see reproduction attached). The index number shall correspond to the official designation of the vessel, the group number shall conform to the Navy Filing Manual, and the file number shall conform to the master index sheets for machinery and electrical plans. Where a set of plans applies to a group of two or more vessels, all plans shall be indexed under the lowest numbered vessel of the group; in special cases where plans do not apply to all vessels of the group, such plans shall be indexed under the lowest numbered vessel of that group, and a notation made in or near the title to designate the vessel or vessels to which the plans are applicable.

10. The bureau will supply a set of blank index forms for type D drawings which will be filled in by the shipbuilder with india ink, after which the shipbuilder will make blue-line print copies of these forms for each set of plans; the indexed forms will be forwarded to the bureau with the set of type D drawings intended for the bureau's files, and set of blue-line copies will accompany each other set of these drawings.

11. Each set shall be wrapped in a waterproof wrapper and be packed separately, ready for shipment, in flat, strong, wooden cases, in which the sheets shall be so secured that it will be impossible for them to be displaced or crumpled during handling. Sets of machinery, electrical, and radio drawings for the same vessel may be boxed together.

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12. In the purchase of equipment for vessels by direct contract with the bureau, type D drawings conforming to the requirements of the above paragraphs shall be furnished by the contractor with the delivery of the completed material in number of sets as required by the contract.

13. No type D finished plans will be required for the interior communication equipment listed in subparagraph SI-1-h-6(f).

SI-1-h. Instruction books and pamphlets.

1. Instruction books will be furnished by contractors and sub-contractors for main propelling machinery, boilers, air compressors, main forced draft blowers, centrifugal pumps as required by Subsection S47-2, positive displacement rotary pumps as required by Subsection S47-3 and other auxiliary machinery, electrical installations and other important naval equipment furnished by them. These instruction books will contain all necessary pertinent information to insure efficient and economical use of the equipment, such data and information as may be required by the applicable specifications under which furnished, and in general, the following:

(a) General description, including also sufficient sketches, illustrations, and sectional assemblies with appropriate references to drawing numbers and titles.

(b) Installation instructions.

(c) Operating instructions.

(d) Instructions for care and maintenance.

(e) Safety precautions.

(f) Index.

(g) For interior communication equipment listed in subparagraph SI-1-h-6(f) reproductions of approved type B plans.

The books will be printed on a strong grade of paper using a medium size type so as to render easy reading. The size of the printed page shall be approximately 8-1/2 by 10-1/2 inches.

2. The instruction books shall be covered with a strong durable cover of black leather, leatherette, fabrikoid or similar approved material and shall be bound securely so as to prevent detachment of either the covering or the pages. The size of the cover shall be approximately 9 by 11 inches. The front cover shall contain the following information:

(a) Sufficient descriptive data to enable ready identification.

(b) Name and number of all vessels to which the equipment applies.

(c) Contract numbers under which equipment was purchased. If more than one contract number is shown, the vessels supplied under each contract shall be indicated.

(d) Manufacturer's name and address.

A sample of the complete books shall be submitted to the bureau for approval before final printing.

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3. A contractor furnishing more than one set or type of equipment, subject to bureau approval, may incorporate the instruction books of similar or allied equipment in one binder, providing the binder does not become bulky and more difficult to use.

4. The bureau will consider requests by contractors in special cases to furnish descriptive pamphlets instead of instruction books. Such pamphlets shall contain sufficient information to insure that the operating personnel can operate and maintain the equipment properly. The pamphlets shall be bound in a durable cover as described in subparagraph SI-1-h-2.

5. All copies of instruction books required shall be delivered to the supervisor of shipbuilding prior to the delivery of each vessel. Sufficient copies shall be supplied for distribution by the supervisor of shipbuilding as follows:

- (a) Five to the Bureau of Ships.
- (b) Ten to the commanding officer of each vessel, in the case of battleships, cruisers, and aircraft carriers, and five for each other type of vessel.
- (c) Two to the Superintendent of the United States Naval Academy.
- (d) Six books relating only to submarine equipment to the commander, submarine base, New London, Conn., for the submarine school.
- (e) In the case of vessels built at navy yards additional books shall be furnished as follows:
 - (1) Two for the Commandant, Navy Yard, Brooklyn, N. Y.
 - (2) Three for each building yard.
- (f) Two of equipment listed in subparagraph SI-1-h-6(1) to each navy yard, except Cavite, P. I., Portsmouth, N. H. and Charleston, S. C.

6. Instruction books shall in all cases be furnished for the following types of equipment wherever installed:

- (a) Electrical propulsion equipments for all classes of vessels.
- (b) Oil engines of all types, whether for propulsion purposes or not.
- (c) Gasoline engines of all types.
- (d) Main propulsion turbines.
- (e) All turbines for driving electric generators.
- (f) Propulsion reduction gears.
- (g) Oil-burning equipment.
- (h) Distilling plants.

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- (1) Refrigerating plants and boxes.
- (j) Storage batteries, submarine propulsion.
- (k) All auxiliary machinery of new unusual design.
- (l) Interior communication equipment:
 - (1) Electric clocks.
 - (2) Telegraph systems.
- (3) Battery powered telephones.
- (4) Sound-powered telephones.
- (5) General announcing system.
- (6) Under-water log.
- (7) Shaft-revolution indicator system.
- (8) Fire-alarm system.
- (9) Salinity indicator system.
- (10) Automatic telephone system.
- (11) Sound motion picture system.
- (12) Wind direction and intensity system.
- (13) High powered announcing system.
- (14) Electrical character transmission system.

Sl-1-i. Record of electrical installation.

1. Complete information and illustrative matter in connection with the details, layout, test, and operation of all the electrical equipment of a vessel shall be compiled by the contractor and bound by him into a convenient record of the electrical installation; information concerning radio equipment, and the underwater sound system shall not be included, except items connected with the power supply therefor, such as motor generators, etc. Arrangements to include information concerning items of the electrical installation not under the cognizance of the Bureau of Ships shall be made by the contractor with the assistance and to the satisfaction of the supervisor of shipbuilding.

2. In general, the material included shall contain full information in regard to general appearance, details of construction, operation, connections, maintenance, shop test data, and shipboard test data (for standard test forms for electrical tests, see Appendix I) of all electrical machinery, instruments, fittings, appliances, etc., except such as may be covered by bureau standard plans and those excepted by subparagraph Sl-1-i-1. For illustrative purposes, blueprints, photographs, cuts, or other suitable reproductions may be used and these shall be properly numbered or lettered to accompany the text; scales shall not be reduced to a size which would render reproductions difficult to read. Every type of instrument employed in the interior communication and signal systems, as well as generators, motors, controllers, searchlights, rheostats, circuit breakers, storage batteries, switchboards, panels, switchboard instruments, etc., shall be included, with the manufacturer's instructions, testing methods, nomenclature, catalog designation, and ordering instructions therefor. Elementary wiring diagrams shall be included in conjunction with other description and test data for electrical installations. Descriptions and plans of items furnished by the government shall be obtained from the bureau concerned by the contractor and included in the final compilation.

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3. All matter as finally compiled shall be grouped and carefully indexed; the grouping shall be on general lines, as, for example: (a) general, (b) distribution, (c) power, (d) lighting, (e) interior communication, (f) signals, (g) storage batteries, etc. The text may be printed or multigraphed and extracts from manufacturer's catalog covering the apparatus concerned may be bound directly in the record if of convenient size.

4. All copies of the record shall be delivered to the supervisor of shipbuilding prior to the delivery of each vessel. The records shall be grouped into volumes for distribution on the following described basis:

Record of Electrical Installation

VOLUME I - Description.

NOTE 1. - This shall include all of the required information and illustrative matter.

NOTE 2. - This volume may cover a group of vessels when the matter is common to all the vessels of a group.

VOLUME II - Record of Electrical Tests.

NOTE 3. - This shall include blueprint copies of all of the required authenticated electrical tests' records - factory, supplementary factory and shipboard - of the electrical driven auxiliaries, electrical equipment and electrical installation.

NOTE 4. - This volume will apply to only one vessel.

DISTRIBUTION OF BOUND COPIES

Copies to	Volume I	Volume II
Bureau of Ships	3 (original and 2 copies)	2 (original and 1 copy)
Commanding Officer of each vessel of group	1	1
Commandant or supervisor of shipbuilding (at building yard as applicable)	1	1
Navy Yards (same as receive finished plans)	7	0
Bureau of Ordnance	1	0
Superintendent of Naval Academy	1	0

NOTE 5. The original reports from which the blueprint copies are made shall be bound in a cover in the same manner as the blueprint copies.

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5. Any original tracings or extra copies of subject matter specially prepared for the record by the contractor, shall be finally forwarded to the bureau.

6. Every precaution should be observed to see that none of the information compiled in the record falls into the hands of unauthorized persons; see note at the beginning of subsection.

Sl-1-j. Booklet plans of machinery.

1. Information and drawings of the systems hereinafter enumerated shall be prepared by the contractor, and blueprint copies of same shall be bound in suitable paper-backed booklets by him and delivered to the supervisor of shipbuilding prior to the delivery of each vessel. Sufficient copies shall be prepared for distribution by the supervisor of shipbuilding, as follows:

- (a) One to the Bureau of Ships.
- (b) Ten to the commanding officer of each vessel in the case of battleships, cruisers, and aircraft carriers and five for each other type of vessel.
- (c) One to each navy yard.
- (d) Two to the Superintendent of the United States Naval Academy.

2. After all copies have been made the original tracings prepared for the booklets shall be forwarded to the bureau for its files.

3. Drawings for the booklet plans of machinery shall be submitted to the bureau for approval before final tracings. The final form of the drawings supplied shall be as finished tracings on cloth, in sheets 14 by 34 inches with a 1/2-inch margin all around, except on the left edge where a margin of 1-1/2-inches shall be left for binding. No more than one system shall be shown on any sheet, and each system shall be complete. All valves, branches, and connections to main and auxiliary machinery and equipment shall be shown.

4. Drawings shall be clear and distinct and shall show leads of all piping connections and in skeleton diagrammatic arrangement. Copy of bureau's standard drawing may be requested as indicative of what is required. (See bureau type plan 6-Y-374.) At least one tracing showing each of the following systems and connections, as installed in plan, and one showing each as installed in elevation shall be furnished. Certain systems may be shown for each deck if desirable.

For all vessels, except submarines:

- (a) Main and auxiliary steam piping.
- (b) Boiler feed; suction, discharge, and make-up feed piping.
- (c) Auxiliary exhaust piping.
- (d) Fresh-water tanks; filling and suction piping.
- (e) Fire and bilge; suction and discharge piping.

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- (f) Distilling plant; all piping.
- (g) Refrigerating plant; refrigerant, brine, and water piping.
- (h) Steam heating plant; steam and drain piping.
- (i) Pantry, galley, laundry, and bath; fresh-water supply; steam and drain piping.
- (j) Low-pressure steam drainage; piping and traps.
- (k) High-pressure steam drainage; piping and traps.
- (l) Main turbine glands; steam supply, leak-off piping, and steam-leakage-recovery system.
- (m) Main propelling machinery; lubricating oil supply return and purification system.
- (n) Lubricating oil tanks; filling and suction piping.
- (o) Sea valves; suction and discharge connections.
- (p) Compressed air; deck and machinery supply system.
- (q) Fuel oil; tank filling and suction piping.
- (r) Fuel oil; tank heating system, complete.
- (s) Fuel oil; burner supply piping to boilers, galley incinerator, and other special services.
- (t) Electric cable, electric-propulsion arrangement, generators via control station to motors, excitation and control systems.
- (u) Electric-propulsion switching system.
- (v) Ventilation piping; supply and exhaust for machinery spaces.
- (w) Such other additional systems as the Bureau may specify in the individual case.

NOTE:- For destroyers and other small types of vessels where any of the above enumerated systems are not extensive, two or more can be combined and shown on the same sheet if convenient.

5. For heavy-oil engine installations (submarines), items (d), (f), (g), (h), (i), (n), (o), (q), (s), (t), and (u) shall be furnished as given in the foregoing subparagraph and the following additional items:

- (a) Forced lubrication and piston cooling; supply, return, and purification system.
- (b) Compressed air; scavenging, supercharging, and starting system.
- (c) Compressed air; ship's high-pressure system.
- (d) Compressed air; ship's low-pressure system.
- (e) Automatic fuel compensating system.
- (f) Main and auxiliary water systems.

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6. In addition to the foregoing plans, general data for all vessels shall be supplied made up on a similar tracing, and a general synopsis of the official contract trials. The latter will be furnished to the contractor by the bureau, via the supervisor of shipbuilding. The general data required shall include the following items, covering dimensions and outstanding characteristics:

- (a) Hull.
- (b) Propelling machinery.
- (c) Shafting and bearings.
- (d) Propellers.
- (e) Boilers.
- (f) Pumps.
- (g) Auxiliary machinery.
- (h) Condensers and vacuum equipment.
- (i) Lubricating oil capacity and storage.
- (j) Fuel capacity and storage.
- (k) Fresh-water capacity and storage.
- (2) Speeds and performance characteristics on official trials.

SI-1-k. Type B and D drawings - list of plans.

1. In order to obtain uniformity in the preparation of type B, and particularly type D drawings, the following lists of subject items for such drawings are given. For certain vessels some items listed do not apply; for others, necessary items may have been omitted. The lists are not intended to be exhaustive but are furnished only as a general guide; omission of any important item shall not be construed to relieve the contractor of the responsibility for furnishing either type B or type D drawings; pertaining to same if required. It is understood that these items are meant to include only work which is under the cognizance of the Bureau of Ships.

2. For the following items, arrangement or assembly drawings will be required with such detail drawings or information as are necessary for a clear understanding of the item and to permit reproduction of parts which are subject to wear or breakage and which may require replacement. The details of parts may be made on the same sheet as the arrangement or assembly plan, may be in form of a descriptive note, or may be on one or more separate sheets.

- (a) Bilge drainage system, machinery spaces.
- (b) Blacksmith shop.
- (c) Feed regulators.
- (d) Fire extinguishers, machinery spaces (steam).
- (e) Floor plates, machinery space.
- (f) Forced-draft system.
- (g) Foundations, important machinery.
- (h) Foundry.
- (i) Gear, locking, main and bilge injection, distance, valve operating.

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- (j) General workshop.
- (k) Gratings, machinery spaces.
- (l) Guards, main propulsion units.
- (m) Heating system:
 - (1) Steam, living spaces.
 - (2) Coils, fuel-oil tanks.
- (n) Indicators:
 - (1) Temperatures.
 - (2) Fuel-oil tank gage.
 - (3) Smoke.
- (o) Ladders, machinery spaces.
- (p) Lagging and heat insulation.
- (q) Oil purification apparatus.
- (r) Piping.
- (s) Protective devices, electric propulsion controls.
- (t) Shop arrangements.
- (u) Sirens, steam (arrangement of piping and mechanical pulls).
- (v) Smoke pipes.
- (w) Switching structure, electric propulsion control.
- (x) Tanks, air.
- (y) Trial equipment.
- (z) Uptakes, boiler.
- (aa) Valves:
 - (1) Sentinel.
 - (2) Sluice, gate.
- (bb) Ventilating system, machinery spaces.
- (cc) Whistles, steam and electric (arrangement of piping and mechanical pulls).

3. For the following items, assembly and complete detail plans will be required:

- (a) Air accumulators:
 - (1) Compressors.
 - (2) Ejecting apparatus for condensers.
 - (3) Flasks and plugs, Diesel engines.
 - (4) Starting and reversing gears, Diesel engines.
- (b) Augmenters, vacuum.
- (c) Bearings:
 - (1) Main shafting.
 - (2) Main thrust.
 - (3) Turbine thrust.
- (d) Blowers:
 - (1) Ventilating, electric propulsion equipment.
 - (2) Forced draft, fire rooms.
 - (3) Soot.
- (e) Boilers:
 - (1) Auxiliary.
 - (2) Main.
- (f) Bolts, holding down, main propulsion units.
- (g) Cables, electric-propulsion units.
- (h) Circuit breakers.
- (i) Clocks, electrical.

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- (j) Clutch gear, main propulsion.
- (k) Condensers.
- (l) Coolers.
 - (1) Air.
 - (2) Oil.
 - (3) Water.
- (m) Distilling plant and auxiliary equipment.
- (n) Eductors.
- (o) Engines, main propelling.
- (p) Expansion couplings, shaft.
- (q) Expansion joints for piping.
- (r) Fair-waters.
- (s) Filters, lubricating oil.
- (t) Gages:
 - (1) Bridge.
 - (2) Turbine clearance.
- (u) Gear, lifting:
 - (1) Lifting, for important machinery.
 - (2) Operating:
 - (a) Main engines.
 - (b) Smoke pipe.
 - (c) Damper.
 - (d) Valves.
 - (3) Turning or jacking, main propulsion units.
- (v) Generators, main propelling.
- (w) Governors:
 - (1) Auxiliary units.
 - (2) Main propulsion units.
- (x) Grease extractors.
- (y) Hoisters:
 - (1) Water.
 - (2) Oil.
- (z) Indicator gear:
 - (1) Auxiliary units.
 - (2) Main engines.
- (aa) Indicators:
 - (1) Revolution.
 - (2) Salinity.
- (bt) Insulators, electric propulsion cable.
- (cc) Interlocks, electric propulsion.
- (dd) Lubrication:
 - (1) Auxiliary units.
 - (2) Main propulsion units.
- (ee) Mandrels for white metal, main bearings.
- (ff) Manifolds and all important piping.
- (gg) Meters, torsion.
- (hh) Micrometer gear, main propulsion units.
- (ii) Motors, electric propulsion.
- (jj) Mufflers, exhaust, Diesel engines.
- (kk) Oil fuel system.

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- (ll) Packing:
 - (1) Gland:
 - (a) Auxiliary turbine.
 - (b) Main turbines.
 - (2) Metallic, main engines.
- (mm) Potheads, propulsion cables.
- (nn) Propellers.
- (oo) Pumps.
- (pp) Reduction gear, main propulsion units.
- (qq) Refrigerating plant.
- (rr) Relays, electric propulsion control.
- (ss) Rheostats, electric propulsion control.
- (tt) Separators:
 - (1) Oil.
 - (2) Steam.
- (uu) Shafting, main propulsion.
- (vv) Strainers:
 - (1) Macomb.
 - (2) Oil.
 - (3) Steam.
- (ww) Stuffing boxes:
 - (1) Bulkhead:
 - (a) Pipe.
 - (b) Shaft.
 - (2) Main engine.
 - (3) Stern tube.
- (xx) Switchboards, electric propulsion control.
- (yy) Switches, electric propulsion control.
- (zz) Tanks:
 - (1) Air.
 - (2) Feed and filter.
 - (3) Ice making.
 - (4) Oil.
- (caa) Tools, special.
- (bbb) Transformers, electric propulsion.
- (ccc) Turbine, special control, main propulsion units.
- (ddd) Turbines:
 - (1) Auxiliary.
 - (2) Main propulsion.
- (eee) Valves:
 - (1) Boiler blow.
 - (2) Check.
 - (3) Feed stop and check.
 - (4) Composition gate above 2-1/2-inches (where not standard).
 - (5) Composition globe, angle and cross above 2-1/2-inches (where not standard).
 - (6) Injection.
 - (7) Reducing or regulating.
 - (8) Relief.
 - (9) Safety, boiler.
 - (10) Sea.
 - (11) Spring-loaded or pressure-regulating, exhaust.
 - (12) Stop, boiler.
 - (13) Throttle.
 - (14) Toggle operated stop and cut out valves in the main steam lines.

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4. For certain classes of equipment, such as those where mechanical fit is not an object, where it may be manifestly impracticable for the manufacture of replacement parts to be attempted by naval personnel; or where the item in question is in accordance with approved naval standards or so standardized industrially as to be readily obtainable by purchase in practically any United States port, types B and D drawings in the form specified above will not be required. In lieu of hand tracings or photographic tracings, however, sufficient information shall be supplied by photographs, illustrations, printed matter, etc., to enable the equipment in question to be readily understood and to permit all parts to be ordered for replacement. The following list of items is given as indicative of equipment covered in this subparagraph:

- (a) Bolt forcers.
- (b) Calorimeters.
- (c) Chain blocks.
- (d) Cleaners, tube.
- (e) Clocks, nonelectrical.
- (f) Electrical metering instruments, switchboard and portable.
- (g) Flue-gas analyzing outfits.
- (h) Fuses.
- (i) Gages (steam, vacuum, air, water, and oil) except special types.
- (j) Indicators:
 - (1) Diesel engine.
 - (2) Steam engine.
- (k) Instruments, electric propulsion.
- (l) Joints, universal.
- (m) Machine tools (except motors and other electrical equipment).
- (n) Meters:
 - (1) Oil.
 - (2) Water.
- (o) Pipe fittings.
- (p) Pyrometers.
- (q) Springs.
- (r) Thermometers.
- (s) Transformers, instruments.
- (t) Tools:
 - (1) Hand (except special wrenches, etc.)
 - (2) Machine (except motors and other electrical equipment).
 - (3) Workshop.
- (u) Traps, except vacuum traps for turbine drainage.
- (v) Valves:
 - (1) Made from bureau standard plans, Bureau of Ships (INT) specifications, Navy Department specifications, or Supplementary General Specifications, except toggle operated stop and cut-out valves in main steam line.
 - (2) Composition gate, globe, angle and cross, 2-1/2-inches and under.

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5. The following items for plans of electrical installation of vessels are listed to be furnished by the contractor:

(a) Power system:

- (1) Elementary diagram of power distribution system (refer to type and contract plans. See also subpar. SI-1-k-5(e)(1)).
- (2) Electrical data for motor driven auxiliaries (standard form, Bureau drawing 9-S-4729-L).
- (3) Power analysis and summary of feeders (standard form for A.C. Bureau drawing 9-S-4704-L. See also subpar. SI-1-k-5(g)(5)).
- (4) Isometric wiring diagram of Battle and General systems.
- (5) Isometric wiring diagram of Emergency system (including portable storage battery leads and charging circuits).
- (6) Elementary diagram of bus tie feeders between switchboards, generator cables and shore connection cables.
- (7) Elementary diagram of control, interlock and indicating connections (circuits) between switchboards.
- (8) Elementary diagram of vent sets power and control, and vent system closures and control.
- (9) Elementary diagram of electric furnace power and control.
- (10) Elementary diagram of all systems of remote control of circuits.
- (11) Elementary diagram of control and starting circuits of emergency generator starting.
- (12) Isometric diagram of heating, starting, and radio testing installations.
- (13) Isometric wiring diagram of power circuits in gun turrets and mounts.
- (14) Isometric wiring diagram of cable leads for main propulsion (also an elementary wiring diagram).
- (15) Working wiring deck plans.
- (16) List of feeders and mains of Battle, General, and Emergency systems (standard form Bureau drawing 9-S-4746-L).
- (17) List showing switch arrangements, loads, fusing, etc., of distribution panels.
- (18) Summary list of all storage batteries on vessel showing charging arrangements.
- (19) Complete list of transformers with load data.

(b) Lighting system:

- (1) List of lighting fixtures and appliances with symbols (standard form, Bureau drawing 9-S-4905-L. See also subpar. SI-1-k-5(b)(15)).
- (2) Isometric wiring diagram of Battle and General systems.
- (3) Isometric wiring diagram of Emergency system.
- (4) Outline plan of vessel showing exact locations of all searchlights, running, anchor, and signal lights.
- (5) Elementary wiring diagram of running, anchor, and signal lights.
- (6) Isometric wiring diagram of running, anchor, and signal lights.

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- (7) Isometric wiring diagram of lighting circuits in gun turrets and mounts and torpedo mounts.
- (8) Plan showing locations of all flight deck lights.
- (9) Elementary diagram of circuits of all flight deck lights.
- (10) Elementary diagram of control of all flight deck lights.
- (11) Elementary diagram of control of hangar deck lighting.
- (12) Elementary diagram of remote control of general lighting.
- (13) Working wiring deck plans.
- (14) List of feeders and mains of Battle, General, and Emergency systems (standard form, bureau drawing 9-S-4745-L).
- (15) List showing switch arrangements, loads, fusing, etc. of distribution panels.
- (16) Load, analysis and summary of feeders (standard form for A. C. bureau drawing 9-S-4704-L. See also subpar. SL-1-k-5(a)(3)).
- (17) Summary of lighting system equipment (standard form, bureau drawing 9-S-4905-L. See also subpar. SL-1-k-5(b)(1)).
- (18) Illumination survey data (standard form, bureau drawing 9-S-4901-L).

(c) Interior-communication and fire-control systems:

- (1) Elementary wiring diagram of each interior-communication and fire control system. The Government will supply type B and type D plans of elementary wiring diagrams of self-synchronous fire-control circuits.
- (2) Diagram of current supply to interior-communication switchboards.
- (3) List of voice-tube outlets.
- (4) List of telephones (sound powered, automatic announcing).
- (5) Isometric wiring diagram of each interior-communication and fire-control system.
- (6) Load summary of all circuits emanating from interior-communication switchboards (standard form, bureau drawing 9-S-5112-L).
- (7) Deck plans (1/4-inch scale on surface ships, 3/8-inch scale on submarines); separate sets of plans for interior-communication and fire-control systems.
- (8) Summary of interior-communication and fire-control equipment (standard form, bureau plan 9-S-5113-L).
- (9) Plans showing the mounting arrangements in the ship of:
 - (a) Shaft revolution transmitters.
 - (b) Underwater log odometer and transmitter.

(d) General plans for all miscellaneous electrical systems and installations in the following spaces (these plans are in addition to those submitted as purely general arrangement plans for joint approval of the bureau concerned):

- (1) Wireways.
 - (a) Wireway deck plans. - Composite for all systems - power lighting, I.C., F.C., radio, sound, steering gear selsyn, etc. including thereon the following minimum information:
 - (1) Location of runs.
 - (2) Approximate space dimensions of runs.
 - (3) Designation of methods of support used for each section of runs.

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- (4)' Designation of sections (and plan numbers for same) for which wireway details are shown on separate plans.
- (5)' Cables in the runs - showing for each:
 - (a)' Circuit number.
 - (b)' Cable type and size.

These plans shall be developed in collaboration with the development of the machinery arrangement (and prior to fixing such arrangement), so as to insure compliance with all cable arrangement (including circuit trunking) and installation specification requirements, allotment of space, etc.

- (b) Wireway details. - As necessary, including the following minimum information:
 - (1)' Arrangement (vertical) of cables in main wireway racks.
 - (2)' Arrangement in gun-director trunk.
 - (3)' Arrangement of gun mounts.
 - (4)' Wiring tunnels.
 - (5)' Arrangements at important locations, such as engine and fireroom bulkheads, vicinity of main switchboards I.C. and F.C. switchboards, etc.

NOTE: - Detail data such as shop drilling data for stuffing tubes in decks and bulkheads, etc., are not required for type D and D plans.

The nature of these plans (wireway details) will not permit specific checking for complete approval by the bureau, and therefore the local supervisor of shipbuilding will act on such plans, and by close follow up shall be responsible for designs and installation being in as full compliance as practicable with the requirements and intent of the applicable specifications. Also in this connection, regardless of whether shown on detail plans or not, departures from specifications (including standard installation methods) will be approved by the supervisor of shipbuilding upon installation only in instances where the installation is such that such departure is necessary. Copies of such plans given local approval shall be furnished for the information and files of the bureau. Any particular matters in connection with these matters (wireway details) on which the bureau's decision is considered necessary, shall be submitted with full particulars and recommendations.

- (2) Dynamo flats. - Diesel engine generator rooms - switchboard rooms - etc. (to show arrangements of generator sets, rheostats, voltage regulator units, switchboards).
- (3) Storage-battery compartment and arrangement of battery-charging station.
- (4) Arrangement of electrical workshop.
- (5) Steering-gear room.
- (6) Turrets and mounts.
- (7) Turret.
 - (a) Column and base.
 - (b) Castings.

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- (8) Torpedo tubes.
- (9) Torpedo rooms.
- (10) Refrigerating plant spaces.
- (11) Machinery spaces.
- (12) Boiler rooms.
- (13) Motor rooms.
- (14) Bridge.
- (15) Central station.
- (16) Chart house.
- (17) Conning tower.
- (18) Armored access and wiring tubes.
- (19) Control rooms.
- (20) Maneuvering rooms.
- (21) Fire-control and director stations.
- (22) Gyro rooms.
- (23) Interior-communication room.
- (24) Cable installations at exposed guns and directors.
- (25) Masts.
- (26) Pilot house.
- (27) Plotting rooms.
- (28) Photographic laboratory.

(a) Miscellaneous.

- (1) Schedule of type B plans of electrical installation. - This schedule shall consist of a tabulation of the plans required of the electrical installation of the vessel or vessels concerned; listing in parallel columns: (a) The titles; (b) the contractors plan numbers (with column for alteration numbers); (c) the Bureau of Ships plan numbers (with column for alteration numbers; (d) the estimated date of submission for approval and (e) remarks; additional columns may be added to suit the contractors convenience.
- (2) A plan listing all methods of supporting cables, fixtures, panels, appliances, etc., by bureau plan, alteration, and method numbers as used; and delineating any proposed methods which are departures from the bureau standard methods. Also plans shall be furnished of any nonstandard (special) fixtures and appliances used.
- (3) Diagrammatic wiring plan of power and lighting systems and diagram of connections of generator and distribution switchboard as required for proper care and operation of the electric plant. (Refer to subpart Sl-1-k-5(a)(2)). The plans shall be reduced to a size that is legible and can conveniently be handled, and mounted in one of the following ways:
 - (a) On sheet metal or other suitable rigid material and covered with a transparent sheet. These plans shall be uniform in size and mounted in a suitable case so that they can be hinged or slipped out for inspection. The individual sheets shall not be removable.
 - (b) As photo reproductions on linen-cloth sheets of uniform size suitable for keeping in plan book form. The book shall consist of steel binders, approximately 20 inches x 12 inches overall covered with artificial leather with title of book and

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name and number of vessel or vessels stamped thereon in gold letters. One book to be permanently located at each main and emergency switchboard and one in the Log Room.

- (4) List of electrical weights showing manufacturer's or contractor's drawing numbers, bureau drawing numbers, quantity, unit weights, and total weights, in pounds, of all electrical material installed, whether furnished by the contractor or bureau. (Bureau standard form, bureau drawing 9-S-3617-L.)

(f) All electrical apparatus and equipments. (Refer to detail requirements of applicable Subsections of General Specifications for Machinery, Supplementary General Specifications for Machinery, Bureau of Ships (INT) specifications, and Navy Department specifications.)

6. The following type B and D plans of the radio installation in vessels shall be furnished by the shipbuilding contractor. Type B radio plans should be submitted for approval separate from all other plans and in any order desired. It is not intended that the approval of radio plans will, in any way, affect the plans of the electrical, interior communication, underwater sound, or other equipment installed in radio spaces. All plans required hereunder shall be indexed under file Group S67.

(a) Wiring:

- (1) Elementary diagram of complete radio installation in vessel (exclusive of broadcast receiving antenna distribution system).
- (2) Isometric diagram of complete radio installation in vessel (exclusive of broadcast receiving antenna distribution system).
- (3) Elementary diagram of complete radio broadcast receiving antenna distribution system.
- (4) Isometric diagram of radio broadcast antenna distribution system.

(b) Arrangement:

- (1) General arrangement of each radio space in vessel (including radio central, radio transmitter room, emergency station, direction finder stations, motor-generator rooms, etc., where applicable).
- (2) General arrangement of all topside transmitting and receiving antennas (including rod, whip and special types).
- (3) General arrangement of antenna trunks and lead-ins and/or transmission lines.

(c) Miscellaneous:

- (1) Detailed plans and/or instruction books for all radio equipment or special material furnished by the contractor. (Detailed plans and instruction books of "Government Furnished" radio equipment are not required to be furnished by the shipbuilding contractor).
- (2) List of all items of equipment comprising the complete radio installation.

7. The shipbuilding contractor shall furnish the following type B and D plans of the underwater sound and electric visual signalling installations. The type B plans of these two systems should be submitted for approval separate from all other plans and in any order desired. It is not intended that the approval of

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communication or other equipment installed within the same space as the underwater sound equipment. The plans required hereunder of the electric visual signalling equipment shall be indexed under file Group S66 and those of the underwater sound system under file Group S68.

(a) Wiring:

- (1) Elementary diagram of the complete electric visual signalling system.
- (2) Isometric diagram of the complete electric visual signalling system.
- (3) Elementary diagram of the complete underwater sound system.
- (4) Isometric diagram of the complete underwater sound system.

(b) Arrangement:

- (1) Arrangement plan indicating the location of each unit of the electric visual signalling system.
- (2) Arrangement of each underwater sound space and of other spaces in which units of the underwater sound are installed, including sea chests and hull fittings.

(c) Miscellaneous:

- (1) Detailed plans and/or instruction books for all electric visual signalling and underwater sound equipment or associated special material furnished by the shipbuilding contractor. (Detailed plans and instruction books of "Government Furnished" equipments are not required to be furnished by the shipbuilding contractor).
- (2) List of all items of electric visual signalling and underwater sound equipment comprising the complete installation.

S1-1-1. Electrical plan requirements.

1. Plans showing runs of wire leads and structural work together shall have the wire leads shown as heavy lines, and structural work (outlines of decks, bulkheads, etc.) in light lines.

2. All working deck plans and general arrangement plans showing electrical wiring, shall have all structural work shown (such as doors, hatches, skylights, stanchions, coal chutes, manholes, removable plates, together with their names and compartment numbers, etc.) which might in any way affect the run of the electrical wireways.

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3. The symbols used on plans to indicate types of appliances, fixtures, etc., shall be in accordance with Bureau of Ships standard plan 9-S-3744-L. Each plan on which appliances, fixtures, etc., are shown by a symbol shall, for convenient identification, have on it a table which shall show in parallel columns each symbol used with its name and/or descriptive identification; this applies in particular to isometric and working wiring deck plans. All cables shown on plans shall be identified in accordance with Subsection S28-2. Where bureau standard forms are available they shall be followed in the preparation of plans.

4. Working wiring deck plans shall be of 1/4-inch scale on surface vessels and 3/8-inch scale on submarines; or larger as required for satisfactory legibility. These plans shall be submitted after diagrammatic (elementary and isometric) plans have been approved, and shall show the proposed location and type of fixtures, approximate location of motors and motor generators, fans, I.C. instruments, and all other electrical apparatus, complete wiring, nature of wireways, and all appliances, such as feeder junction boxes, feeder distribution boxes, distribution boxes, switches, receptacles, etc.

5. Each system wiring plan shall have a reference plan table referring to all other plans of the system (this includes elementaries, isometrics, deck and feeder lists); this table shall list in paralleled columns both the contractors and bureau numbers and alterations of each. In the case of deck plans, one of the decks (preferably Hold-Ford) only, shall bear the list of reference plans and their respective alteration numbers - in case of alteration to one of the system plans, it will therefore be necessary only to change the alteration numbers of reference plans on only this single deck plan.

6. The schedule of plans of electrical installation and the elementary diagram of the power distribution system shall be submitted at the earliest practicable date after award of contract. All power systems lighting system, and general plans as listed in subparagraph Sl-1-k-5 shall be submitted for approval in the general order stated in that subparagraph.

7. On elementary and isometric wiring diagrams and on deck plans, the extensive use of single lines to represent several cables, is unsatisfactory; a limited use of single lines for this purpose will be satisfactory. However, this shall be limited to instances where a group of leads start at one point (as at a panel or terminal board) and all proceed in the same direction to end in one general vicinity - and in these instances there should be no branches off the main single line run; wherever the single line scheme is used the leads shall be carefully labelled at each end of the single line where they are again separated.

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8. All interior-communication and fire control plans shall be submitted for approval in the order stated in subparagraph SI-1-k-5 and on separate sheets. One system only shall be shown on a sheet. Additional plans which may be necessary to show special features or points not otherwise clear shall be submitted as required. Deck plans shall show general arrangement and wireways, including location of junction boxes, distribution boxes, and other principal wiring appliances. There shall be furnished sheets containing general summary of the interior-communication and fire control instruments, accessories, and wiring appliances, giving both contractor's and bureau drawing numbers.

9. The diagrams on lists of lighting feeders and mains shall show the number of each and every circuit and circuit section (feeders, mains, submains, and branches). In this numbering care must be exercised in order to leave numbers available in sequence for each spare connection in a box (each spare on a box should be shown by a stub line). Also the deck plans shall show the number of each circuit (feeders, mains, submains, and branches) which passes through a deck bulkhead, or barrier or out of the same compartment from which it is fed; refer to Subsection S28-2. This marking is intended to provide proper identification of the circuits, so as to facilitate the tracing of the circuit after installation.

10. The approved type B plans of the electrical installation shall be followed in making the actual installation except as modified by this paragraph and any major developments or deviations therefrom - which are approved locally by the supervisor of shipbuilding or the navy yard - shall be accompanied by immediate alteration of the approved type B plans involved to show such departures. By major developments or deviations is meant changes which if not shown would lead to confusion in checking or tracing a circuit or fittings. Since the installation as actually made will be in strict conformity with and shown in all important details on the type B plans, which will thus include all such major developments and alterations made and approved by local authority, it is contemplated that new tracings made of such type B plans will be furnished as the type D drawings required under paragraph SI-1-g. It shall be noted in particular, that on this basis it will not be necessary to make wiring deck plans from the work to show exact locations of cables, fixtures, etc. - it being considered sufficient that the wiring installation plans shall have cables, fixtures, appliances, etc., shown in the proper compartments in their approximate locations, irrespective of exact location, as in the case on the type B plans. No type D finished deck plans will be required of the interior-communication and fire-control systems. Where one set of type D finished plans are furnished for more than one vessel of a group, all major departures for any individual vessel or vessels shall be clearly indicated by notes on the basic plan, or by such supplementary plans as may be necessary if such departures are extensive.

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11. The general plans, required by paragraph SI-1-k-5(d), items 2 to 28 inclusive, shall be entitled "General arrangement of electrical equipment in - - - - -" and shall include the following minimum information:

- (a) Outline views of all electrical equipment in the compartment (shown in heavy weight lines).
- (b) Location of all stanchions, hatches, doors, vent ducts, beams, manholes, salt water pipes, fresh water pipes, etc.
- (c) Outline views of all other equipment in the compartment, such as Diesel engines, turbines, etc. (shown in light weight lines).
- (d) Outline views only of wireways. Individual detail run of cables are specifically not desired.
- (e) A small scale sketch showing the relation of the compartment to surrounding compartments, including accesses, etc.

Where plans showing the detail run of individual cables in the various compartments are required by the shipyard they shall be entitled - "Arrangement of wiring installation in - - - - -". These plans should not be forwarded to the bureau for approval or file unless specifically requested.

SI-1-m. Radio plan requirements.

1.. Wiring:

- (a) The elementary wiring plan of the complete radio installation in a vessel should preferably be on one sheet and include all radio apparatus to be installed in all spaces. No other apparatus or wiring except radio should be included on this plan. Each space, in which radio apparatus is to be installed, should be indicated on plan by an outlined area appropriately labeled and each unit of the various equipments indicated therein by block method. Each cable between units within a space and between spaces may be indicated by single heavy lines. Single lines to represent more than one cable should not be used. Each lead shall be marked with cable type and designation. Power supply wiring between the radio power panels and the apparatus, or receptacles therefor, shall be included. Transmitter remote control, radiophone, frequency meter and receiver extension circuits and antenna bus circuits, shall be in accordance with type plans furnished by the bureau. Interconnection of equipments shall be in accordance with installation plans or instruction books furnished by the manufacturers of the equipments or by the bureau.
- (b) The isometric wiring plan of the radio installation should include only that portion of the different decks traversed by the radio cables and transmission lines. All cables between radio spaces, radio direction finder stations, remote control stations, motor-generator spaces, etc., shall be included on this plan. All leads shall be marked with cable type and designation to agree with the elementary wiring plan.

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- (c) The elementary wiring plan of the radio broadcast receiving antenna distribution system shall include all wiring between antenna and all outlets. The locations of antenna transformers, amplifiers, filters, branch transformers and all outlets shall be indicated on plan. Cable types and designations shall be indicated. If space permits, the isometric wiring diagram may be included on same plan with elementary wiring. The runs of all cables and the locations of all units of the system shall be shown on the isometric diagram. (See subsection S67-1).

2. Arrangement:

- (a) A plan view and an elevation view of each bulkhead, in which radio apparatus or material is concerned, should be shown for each radio space, main communication station, coding room, direction finder station, motor-generator room or other space in which an appreciable amount of radio equipment is installed. Spaces in which only remote station units, such as radiophone, key-control and jackbox units are installed, need not be included on radio arrangement plans. All radio equipment and material should be indicated by heavy lines. Structural members, ventilating ducts, piping, electrical equipment, interior communication equipment and all other apparatus or material, which may or may not affect the arrangement of radio equipment, should be indicated in outline by light lines. No wiring except antenna busses, and connecting leads thereto, should be shown on arrangement plans.
- (b) Arrangement plans of topside antennas shall include an elevation view (profile) and a plan view if necessary to clearly show all antennas. The plan(s) shall show all transmitting, receiving and direction finder sense antennas and their lead-ins to the point of entrance. Routing, points of attachment, yardarms, outriggers, pendants, insulators and size, type and length of wire or cable should be indicated on these plans.
- (c) Arrangement plans of antenna trunks shall show the routing, size, length, size of conductor, type and number of supporting insulators and number of access openings.

3. Miscellaneous:

- (a) Detailed plans and instruction books shall be furnished covering all radio equipment furnished by the contractor, except where specifically waived. This requirement is not intended to include minor items of incidental installation material such as cable, stuffing tubes, clamps, brackets, etc., but only major items of radio apparatus furnished by the contractor. Plans shall include sufficient details to permit manufacture therefrom. Instruction books shall include sufficient information to permit installation, operation and maintenance by Navy personnel. The books should be submitted to the Bureau for approval.

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- (b) The list of radio equipment plan shall include information grouped under the following headings where applicable - Symbol or symbol number (or both), quantity, navy model or type; description, serial number, supply voltage, ship's power required, weight, Bureau drawing number, manufacturer's drawing number, remarks, and any other information desired added by the contractor.

S1-1-n. Underwater sound and visual signalling plan requirements.

1. Wiring:

- (a) The elementary wiring plan of each complete underwater sound and visual signalling installation in a vessel should preferably be on one sheet and include the apparatus to be installed in all spaces or locations. No other apparatus or wiring except underwater sound or visual signalling should be included in these plans. Each space, in which the apparatus is to be installed, should be indicated on plan by an outlined area appropriately labeled and each unit of equipment indicated therein by block method. Each cable between units within a space and between spaces shall be indicated by single heavy lines. Single lines to represent more than one cable should not be used. Each lead shall be marked with cable type and designation. Power supply wiring between the power panels and the apparatus shall be included. Interconnection of equipment shall be in accordance with installation plans or instruction books furnished by the manufacturer of the equipment or by the Bureau.
- (b) The isometric wiring plans of the underwater sound and visual signalling installations should include only that portion of the different decks traversed by the cables. All leads shall be marked with cable type and designation to agree with the elementary wiring plan.

2. Arrangement:

- (a) A plan view and an elevation view of each bulkhead, in which underwater sound apparatus or material is concerned, should be shown for each underwater sound space, motor-generator room or other space in which an appreciable amount of sound equipment is installed. All sound equipment and material should be indicated by heavy lines. Structural members, ventilating ducts, piping, electrical equipment, interior communication equipment and all other apparatus or material, which may or may not affect the arrangement of sound equipment, should be indicated in outline by light lines:

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- (b) Arrangement plans showing the electrical visual signalling equipment shall show location of the 12-inch and 24-inch searchlights in plan view and all interferences in elevation to show coverage of each light.

3. Miscellaneous:

- (a) Detailed plans and instruction books shall be furnished covering all underwater sound and visual signalling equipment furnished by the contractor; except where specifically waived. Plans shall include sufficient details to permit manufacture therefrom. Instruction books shall include sufficient information to permit installation, operation and maintenance by Navy personnel. The books should be submitted to the Bureau for approval.
- (b) The list of underwater sound and visual signalling equipment plan shall include information grouped under the following headings where applicable - symbol or symbol number (or both), quantity, navy model or type, description, serial number, supply voltage, ship power required, weight, Bureau drawing number, manufacturer's drawing number, remarks, and any other information desired added by the contractor.

SI-1-o. Symbols for electrical installation of vessels.

- 1. Symbols used on drawings to indicate type of appliances, etc., shall be in accordance with Bureau of Ships plan No. 9-S-3744-L, revised to date of bid.

SI-1-p. Inspection and performance acceptance tests.

- 1. Unless otherwise specified, the inspections and tests made in accordance with the requirements of the applicable specifications shall be recorded in a complete test report as hereinafter stated. These reports may be made on manufacturer's or contractor's test forms, except when Standard Forms (See Appendix I) have been prepared by the Bureau.

- 2. The inspections and tests which may be required by the applicable specifications and which shall form the basis of test reports are as follows:

- (a) Separate tests of driving or driven units.
- (b) Combined assembly tests of driving and driven units.

- 3. For all combined assembly tests, each performance acceptance test report shall include:

- (a) Test report of driving unit. For alternating-current motors refer to Navy Department Specification 17M10 and Factory Test Record, Form I.N.M. 34. For direct-current motors refer to Navy Department Specification 17M17 and Factory Test Record, Form I.N.M. 21.

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- (b) Test record of controller (if involved). For alternating-current controllers, refer to Navy Department Specification 17C10 and Factory Record, Form I.N.M. 35. For direct-current controllers refer to Navy Department Specification 17C17 and Factory Record, Form I.N.M. 23.
- (c) Test record of generators (if involved). For alternating-current generators, refer to Navy Department Specification 17G8 and Factory Record, Form I.N.M. 36. For direct-current generators refer to Navy Department Specification 17G7 and Factory Record, Form I.N.M. 22.
- (d) Test record of driven unit, including copies of all recorded test data and characteristic curves plotted therefrom (where required).
- (e) Test report of the combined assembled unit, including a definite report on the suitability of the driving unit (and controller, if furnished) for its specific application and harmony of assembly of all independent units going to make up to the complete equipment. For motor-driven units refer to Factory Record, Form I.N.M. 34a.

4. Distribution of complete test reports on the combined assembled units shall be as follows:

- (a) Two to Bureau of Ships.
- (b) One to each vessel concerned (to be forwarded via supervisor of shipbuilding or commandant of the building yard).
- (c) Two to each supervisor of shipbuilding (one for the supervisor's files, the other for the shipbuilder), for privately built ships.
- (d) One to commandant of each building yard concerned, for navy yard built vessels.
- (e) One for primary district inspection office.
- (f) One for branch inspection office (if any).

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Edge of plan

LIST OF MATERIAL

(Quantities are for 1 globe valve)

Place No.	Name of piece	Number required	Material	Material specifications	Drawing Nos. ¹	
					Contractor	Owner
1	Body	1	Cast steel	4881, Cl. B		
2	Bonnet	1	Cast steel	4881, Cl. B; note 1		
3	Seat	1	Forged steel	4881, CRB; note 2		
4	Disk	1	Wrought steel			
5	Disk nut	1	Wrought steel			
6	Stem	1	Boiled steel	4881, CRB		
7	Nut for pc. 6	1	Brass			
8	Gland	1	Brass			
9	Yoke	1	Wrought steel	4881, note 1		
10	Standard	1	Forged steel	4881, Cl. A; note 1		
11	Nut for pc. 10	1	Forged steel	4881, Cl. A; note 1		
12	Wash wheel	1	Aluminum alloy	4881, Cl. 2		
13	Bottom stud	1	Steel	4881, Cl. B		
14	Nut for pc. 13	1	Steel	4881, Cl. C		
15	Gland stud	1	Brass	4881, note 1		
16	Nut for pc. 15	1	Brass	4881, note 1		
17	Split pin for pc. 1	1	Brass	4881, note 1		
18	SPARE	1	See above			

¹ These columns, shown in leader, will only be required for finished drawings where reference to other drawings is necessary.

NOTE 1.—If low-carbon steel of following characteristics substituted:

Carbon	0.30 percent maximum
Sulfur	0.03 percent maximum
Phosphorus	0.03 percent maximum
Tensile strength	70,000 pounds per square inch maximum
Yield point	35,000 pounds per square inch maximum
Longitudinal elongation in 2 inches	25 percent minimum
Transverse elongation in 2 inches	30 percent minimum
Longitudinal reduction of area	60 percent minimum
Transverse reduction of area	50 percent minimum
Cold bend: 180° to inner diameter of 1 inch	

NOTE 2.—Cast steel complying with chemical requirements of specifications substituted. No physical test, except minimum Brinell No. 200.

NOTE 3.—Surface inspection only.

NOTE 4.—In accordance with specifications, except minimum tensile strength 70,000 pounds per square inch and elongation 25 percent in 2 inches.

NOTE 5.—Twin brass substituted. No test.

Table I.

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ALTERATION COLUMN TO BE LEFT HERE FOR ALL PLANS		THIS SPACE TO BE LEFT CLEAR	
NO ROOM FOR OFFICIAL MARKS AND NAMES OF APPLICABLE VESSEL		THIS COLUMN FOR NAME OF BUILDING MANUFACTURING HALL MARKS	
DD 419 USE HEREIN DD 419 USE HEREIN			
RESERVED FOR NAME ADDRESS AND PLAN NO. OF OTHER SHIPBUILDING CONTRACTORS NAVY YARDS OR SUB-CONTRACTORS			
NAME, ADDRESS AND PLAN NUMBER OF SHIPBUILDING CONTRACTOR BY WHOM PLAN WAS DRAWN			
CONTRACTORS PLAN NUMBER			
DRAWN BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____ APPROVED: _____			
FORWARDED TO BUREAU BY: _____ DATE: _____ LETTER NUMBER: _____ SUPERVISOR OF SHIP. YARD: _____			
EXAMINED AND FOUND CORRECT DATE: _____ SUPERVISOR OF SHIPBUILDING YTD: _____			
TITLE			
BUREAU OF SHIP'S PLAN NUMBER			

ALTERATION COLUMN
TO BE LEFT HERE
FOR ALL PLANS

THIS SPACE MAY BE USED FOR RECORD
OF PARTS BY OTHER DATA FOUND BY
SHIPYARD FOR THE CONTRACTORS PLAN
NO. 100
DO NOT WRITE IN THESE SPACES
UNLESS THEY ARE USED FOR
ALTERATION DATA, MARKS OF MATERIAL
OR ANY OTHER DATA NECESSARY FOR
THE COMPLETE UNDERSTANDING OF PLAN

STANDARD TITLE BLOCK
FOR CONTRACTORS PLANS

SHIPYARD OFFICE
NAVY DEPARTMENT
BUREAU OF SHIP

NO. OF SHIPS NO. 38568

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REPRODUCED AT THE NATIONAL ARCHIVES

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[IMPORTANT.—Frequent reference is made to these Subsections of the General Specifications for Machinery. This copy should be retained as a permanent file record until a revision is issued]

GENERAL SPECIFICATIONS FOR MACHINERY

BUREAU OF ENGINEERING, NAVY DEPARTMENT

Subsection SI-1.—PLANS

September 1, 1938

(Superseding Subsection SI-1, Plans, dated December 1, 1936)

NOTE.—Plans for the machinery, electrical equipment, and accessories of vessels building for the Navy are always of a confidential nature. Care shall be observed that they do not fall into the hands of unauthorized persons, especially those not citizens of the United States.

The following is quoted from an act approved June 15, 1917:—

“* * * whoever, lawfully or unlawfully, having possession of, access to, control over, or being intrusted with any document, writing, code book, signal book, sketch, photograph, photographic negative, blueprint, plan, map, model, instrument, appliance, or note, relating to the national defense, willfully communicates or transmits or attempts to communicate or transmit the same to any person not entitled to receive it, or willfully retains the same and fails to deliver it on demand to the officer or employee of the United States entitled to receive it, or whoever, being intrusted with or having lawful possession or control of any document, writing, code book, signal book, sketch, photograph, photographic negative, blueprint, plan, map, model, note, or information, relating to the national defense, through gross negligence permits the same to be removed from its proper place of custody or delivered to anyone in violation of his trust, or to be lost, stolen, abstracted, or destroyed, shall be punishable by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. * * *

SI-1-a. General requirements.

Reference: (a) Federal Specifications CGC-C-531, Tracing Cloth.

(b) List of Bureau standard plans, see Appendix I.

1. All drawings of machinery and accessories under the cognizance of the Bureau of Engineering, which shall be furnished by and at the expense of the contractor, are grouped under the following general classification:

- (a) *Type A drawings.*—Preliminary drawings, submitted with bids or prior to award of contract.
- (b) *Type B drawings.*—Development or working drawings, submitted for approval subsequent to award of contract, but prior to ordering material or commencing work.
- (c) *Type C drawings.*—Drawings prepared during the progress of work to accompany orders on sub-contractors, particularly orders for steel castings and forgings.
- (d) *Type D drawings.*—Finished drawings, submitted after work is completed.
- (e) In addition to the foregoing, instruction books and pamphlets, plans, and data incorporated in Booklet Plans of Machinery and Record of Electrical Installation shall be supplied as hereinafter described.

2. The Bureau's approval of any type of plan shall not relieve a contractor of any material or performance obligation under the contract, unless a question in regard thereto has been brought to the Bureau's attention in writing, and specific waiver of such requirement by the Bureau has been obtained, see section A-1. All discrepancies discovered in drawings, in specifications, or between drawings and specifications, shall be immediately referred to the Bureau for action.

3. Drawings need not necessarily be made to scale, but where practicable, scaled drawings are preferred. When drawings are not made to scale, such fact shall be clearly stated in the drawing title. In all cases figured dimensions of all parts shall be complete and shall include manufacturing tolerances, working fit, and surface finish, wherever applicable. All dimensions shall be given in feet, inches, and decimals or fractions of inches. Dimensions which apply to fitted parts shall be given in inches and fractions of inches with tolerances in decimal fractions; dimensions of nonfitted parts may be given in inches and decimal or common fractions, dimensions

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greater than 24 inches may be given in feet, inches, and fractions thereof. Where drawings are made to scale one of the following standard scales shall be used.

$\frac{1}{32}$ inch to the foot
 $\frac{1}{16}$ inch to the foot.
 $\frac{1}{8}$ inch to the foot.
 $\frac{3}{16}$ inch to the foot.
 $\frac{1}{4}$ inch to the foot.
 $\frac{3}{8}$ inch to the foot.
 $\frac{1}{2}$ inch to the foot.
 $\frac{3}{4}$ inch to the foot.
1 inch to the foot
1½ inches to the foot.
3 inches to the foot.
6 inches to the foot.
Full size

4. The following plans shall be drawn to scales as indicated, but larger scales are preferred when their employment will not unduly increase the dimensions of the sheet:

- (a) General layout plans of machinery installations of not less than one-quarter inch to the foot;
- (b) Piping layout plans for machinery spaces not less than three-eighths inch to the foot.
- (c) Electrical wiring layout plans for the entire vessel shall be made with decks and other structural features drawn to a scale of not less than one-quarter inch to the foot.

5. All dimensions shall be so placed on drawings that they may be read either from the bottom of the sheet or from the right-hand side.

6. Salient features of the design and performance characteristics of all apparatus shall be prominently shown on every drawing where applicable. Such features shall include—

- (a) *Power input*.—Pounds of steam per hour, kilowatts per hour, pounds of oil per hour, etc.
- (b) *Power output (normal rated and overload)*.—Horsepower, kilowatts, gallons per minute, etc.
- (c) *Pressure*.—Steam, exhaust, suction, discharge, test, bearing, voltage, etc.
- (d) *Speed*.—Revolution or double strokes per minute, feet per second, bearing or journal surface speed, etc.
- (e) *Velocity (steam, liquid, air)*.—Through pipes and orifices, peripheral, etc.
- (f) *Temperature (inlet and outlet)*.—Steam, superheat, liquids, etc.
- (g) *Surfaces (area of)*.—Heating, cooling, grate, etc.
- (h) *Viscosities of liquids handled with corresponding temperatures*.
- (i) *Power losses*.—In same units as (a) and (b).
- (j) *Heat transfer*.—Coefficient or rate.
- (k) *Piping*.—Friction head on suction at rated flow, pressure drop through.
- (l) *Boilers*.—Furnace volume, area through gas passages, uptakes, armor, bars, gratings, etc.
- (m) *Blowers*.—Area of ducts, intake gratings, armor bars, etc.
- (n) *Weights*.—As a whole or per unit, computed or actual, wet and dry.
- (o) *Power characteristics*.—Voltage, frequencies, number of phases, type of windings, starting torque, full-load speed torque, percentage of slip, speed adjustment, duty classification, etc.
- (p) *Characteristic curves*.—Steam consumption, horsepower, head, pressure, capacities, speed, efficiencies, etc.

7. Where parts of machinery are indicated as being right-hand or left-hand, a note shall be added to the drawing explaining in detail the difference between the right-hand and left-hand parts. Drawings of screw propellers, in addition to diameter, pitch, developed and projected areas of blades, etc., shall show indicated or shaft horsepower, effective horsepower, revolutions, and speed of vessel for which the propeller has been designed. Drawings of valves and miscellaneous fittings shall show the number, material, and location of each type and size. All drawings of apparatus using tubes, such as boilers, condensers, superheaters, feed-water heaters, etc., shall include a table showing number, ordering length, diameter, thickness, material, etc., of each type and size of tube required; the same applies to special brick in boiler combustion spaces. All apparatus using electric cable or wire shall include a table giving length, size, and insulation of all cable used.

8. Indicating the materials of construction by distinctive crosshatching is not required on any class of drawing; simple line hatching of complete sections or borders of separate parts shall be used wherever necessary to indicate a junction of two different pieces or otherwise to completely clarify the drawing. When distinctive crosshatching is used it shall conform to Bureau of Engineering standard B-20.

9. The materials of construction shall be indicated on a list of material in all cases whether distinctive crosshatching is used or not, and this list shall appear in the upper right-hand corner of a drawing sheet, expanding to the left, and down as necessary. Since, under the provisions of Subsection S1-2, the list of material becomes

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the medium of agreement between the Bureau and the contractor as to the materials to be employed in construction, it is very important that extreme care be exercised in proper preparation. In order to facilitate Bureau action the following arrangement shall be followed:

- Column 1. The piece number. (In numerical sequences 1, 2, 3, etc.)
- Column 2. The name of piece.
- Column 3. The number required.
- Column 4. The material.
- Column 5. The specification.

10. In the specification column the Navy Department specification and Supplementary General Specifications for Machinery number and class applicable shall always appear for each item considered by the manufacturer to fall in the stressed or otherwise vital class, and so subject to full inspection. Suffix letters, such as the "a" in 43B11a and SGS(41)-37a are not required to identify the particular issue of Navy Department specifications and Supplementary General Specifications for Machinery. The identifying number only, "43B11" or "SGS (41)-37", is necessary. In cases where the manufacturer proposes a substitution, reference to a footnote shall be entered after the Navy Department specification or Supplementary General Specification for Machinery number, and in the footnote the substitution shall be described in sufficient detail as to analyses, tests, heat treatments, etc., as will permit the Bureau to take proper action without further correspondence and in such form that proper inspection can be made. No entry shall be made in column 5 either of specification number or other designation, where the material is nonstressed or nonessential in character. The Bureau, in acting on the plan, will either accept or return this list of material for revision, and having been agreed upon, and approved, the specification column with its footnotes shall serve as the inspecting officer's guide as to whether a full or only a surface inspection shall be applied, see Subsection S1-2. Additional columns will be permitted in the list of

Edge of plan

LIST OF MATERIAL						
(Quantities are for 1 globe valve)						
Piece No.	Name of piece	Number required	Material	Material specifications	Drawing Nos. ¹	
					Contractor	Bureau
1	Body	1	Cast steel	4851, Cl. B		
2	Bonnet	1	Cast steel	4851, Cl. B; note 1		
3	Seat	1	Forged steel	4851a, ORB1; note 2		
4	Disk	1	Nickel alloy			
5	Disk nut	1	Nickel alloy			
6	Stem	1	Roller steel	4851a, ORB1		
7	Nut for pc. 6	1	Brass			
8	Gland	1	Brass	4851c, note 3		
9	Yoke	1	Forged steel	4852, Cl. A; note 4		
10	Standard	2	Forged steel	4852, Cl. A; note 4		
11	Nut for pc. 10	2	Forged steel			
12	Hand wheel	1	Aluminum alloy	48A1, Cl. 2		
13	Bonnet stud	8	Steel	43B11, Cl. B		
14	Nut for pc. 13	8	Steel	43B11, Cl. C		
15	Gland stud	2	Brass	48B5; note 5		
16	Nut for pc. 15	2	Brass	48B5; note 5		
17	Split pin for pc. 6	1	Brass			
2	Seat	1	See above			

¹ These columns, shown in leaders, will only be required for finished drawings where reference to other drawings is necessary.

NOTE 1.—Die-cast carbon steel of following characteristics substituted:

Carbon	0.40 percent maximum.
Sulphur	0.045 percent maximum.
Phosphorus	0.04 percent maximum.
Tensile strength	70,000 pounds per square inch minimum.
Yield point	55,000 pounds per square inch minimum.
Longitudinal elongation in 2 inches	25 percent minimum.
Transverse elongation in 2 inches	20 percent minimum.
Longitudinal reduction of area	40 percent minimum.
Transverse reduction of area	55 percent minimum.

NOTE 2.—Cast steel complying with chemical requirements of specifications substituted. No physical test, except minimum Brinell No. 200.

NOTE 3.—Surface inspection only.

NOTE 4.—In accordance with specifications, except minimum tensile strength 70,000 pounds per square inch and elongation 20 percent in 2 inches.

NOTE 5.—Tobin bronze substituted. No test.

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material to suit the special requirements of a contractor, but there shall be no omissions from the information called for. On page 8 is a typical list of material for drawings and should be followed in carrying out the foregoing instructions. The width of columns and spacing of lines may be increased over that shown to suit requirements.

11. In order to reduce the number of plans for certain classes of material, such as electrical equipment, switchboards, searchlights, and similar apparatus which are made up of parts and subassemblies that are identical except for minor details or in numbers of parts, additional columns may be inserted to the left of column 1. The number required of the items in column 2 (name of piece) shall be tabulated in these additional columns instead of in column 3. This procedure is ordinarily applicable to plans which have been approved previously for similar apparatus on other vessels and may be used for assembly drawings, subassemblies, or detail parts. Essentially each item in column 2 is identified by means of the additional columns. If an item in column 2 does not apply to the latest design, the space opposite that item in the additional column shall be left blank. If a part is changed, a new item shall be added to column 2 and the number required of the new item shall be indicated in the additional column. If the number required of any items is changed the new number required will appear in the additional column. Each additional column shall show all the items that go to make up the complete unit corresponding to that column. These items may be subassemblies or individual parts, depending on the character of the unit. Plans must be complete, permit ready identification of any part, show all details required for duplication of parts and include all parts which go to make up the complete assembly. An explanatory note shall be added to each plan embodying this procedure that will show clearly which additional columns apply to the particular assembly, subassembly, or detail part on the plan, and the complete unit shall be identified by name-plate serial numbers or other positive means.

12. Surface finish shall be indicated for all parts. Where practicable, Bureau standard symbols and method of indicating them shall be used as described below: where the shop practice of a given manufacturer requires symbols differing from the Bureau's standard, the manufacturer's symbols will be acceptable.

FINISH SURFACE MARKS

- | | | |
|-------------------------|--------------|-----------------|
| f 1. Rough tool finish. | f 4. Polish. | f 7. File. |
| f 2. Fine tool finish. | f 5. Drill. | f 8. Scrape. |
| f 3. Grind. | f 6. Ream. | f 9. Spot face. |

13. Each piece will be marked with the character of finish required by inserting the corresponding number in the circle, the arrow being placed against the surface to which the finish mark applies. See figure 1.

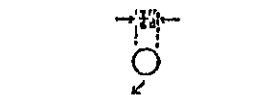


Figure 1

14. The right-hand side of types B and D drawings shall be reserved for titles, list of material, explanatory notes, etc., and type B and D drawings shall conform to the Bureau's type plan 50-R-87 for arrangement.

15. The titles of all drawings shall be complete, and for all drawings, except type A, shall be preceded by the official designation of all vessels to which the drawing applies, as obtained from the special specifications therefor or from the Bureau; viz, BB45, DD240, etc. As soon as the vessels are named, the name of each vessel shall be added to its official designation wherever it appears. Names and designations of vessels shall be placed on drawings in letters not less than one-fourth inch high.

16. Each type D assembly drawing of a set for a given item of apparatus or equipment shall carry a drawing list or index showing all other drawings of the set with identification numbers for ready reference.

17. Where welding is to be used, types A, B, and D drawings shall show welding details clearly and concisely in all important and highly stressed members. For general indications in structural assemblies, the welding symbols of Bureau standard sheet B-154 shall be used; in all such cases, a key to the welding symbols shall be included on the drawing.

18. It is of the utmost importance that the details of the spare parts arranged in a list in conformity with the "List of Spare Parts and Tools" shown on Subsection S31-1 and special tools to be furnished under any requisition, contract or purchase order be clearly shown on both type B and type D drawings. In general, a detailed list of spare parts and special tools to be furnished per vessel, and/or per requisition, contract or purchase order, shall be shown on the general assembly drawing for the equipment in question; in cases where such a list would be too extensive for detailing on the assembly drawing, a separate drawing shall be prepared for this sole purpose. For convenience of the manufacturer, the Bureau will accept a modification of the list of material shown under the preceding subparagraph 10, whereby the columns headed "Number required" may be broken down into two columns, one showing number required for assembly purposes and one showing additional parts to be manufac-

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tured for spares; but such information on detail plans shall not relieve the contractor from the responsibility for furnishing a detailed summary of spare parts and special tools on the general assembly drawing or separate special drawing, as the case may require. Final Bureau approval of the spare parts and special tools will be given on the assembly drawing, or special drawing, in each case, and not on detailed drawings. In particular, when sets of spare parts for a particular equipment are called for by the requisition, contract or purchase order, such as "complete sets of bearings," the summary of spare parts shall show in detail what items constitute a set.

19. In all applications of antifriction bearings of ball or roller types, the assembly plan of the apparatus shall bear a certificate signed by a responsible representative of the bearing manufacturing company showing that the application of each particular bearing proposed for use is approved by his company as to all details of mounting shown, the load and speed to which the bearing will be subjected and the lubrication of the bearing, giving full consideration to the intended service, viz, continuous or intermittent, ambient temperature, disassembly requirements, etc.

SI-1-b. Photographic tracings.

1. Photographic tracing shall be furnished on tracing cloth which is in accordance with Federal Specifications CCC-C-531; white cloth vellum is not acceptable. Photographic tracings shall be right reading and capable of producing a clear and distinct print, and there shall be no distortion nor illegibility of the lines or figured dimensions.

2. Photographic tracings shall be made by an approved photographic process which shall consist of the production of a suitable vandyke negative from the original tracing on special paper; the negative shall then be placed on sensitized tracing cloth and exposed. Following exposure, the tracing cloth shall be passed through a water bath and a developing solution and then carefully wiped clean with cotton or a camels-hair brush to remove foreign or excess substances on the surface.

3. Photographic tracings shall be made with clear, sharp, durable black lines on the dull side of tracing cloth which has been treated with a colorless waterproof coating and sensitized to produce a black line print when exposed under a negative, developed and washed. They shall be of such character as to permit erasures and making alterations in ink with the same facility and degree of permanency as with regular ink tracings. The waterproofing shall withstand at least 20 minutes exposure to water without showing any tendency to break down and shall withstand a sufficient amount of vigorous rubbing necessary to clean out the background without disturbing the lines; breaks, cracks, or spots in waterproofing shall be cause for rejection. The waterproof coat shall adhere to the cloth so that it cannot be stripped from the cloth on either side.

4. The surface of photographic tracings shall be dull mat finish, requiring no top coating or lacquer, and shall possess sufficient tooth to take india ink with the same freedom as natural tracing cloth, and without causing the pen to slip or skip or the ink to spread unduly. The finish shall permit india-ink lines to sufficiently penetrate the surface of the cloth so as to resist removal by chafing with the thumb nail, smudging the lines by damp hands under pressure, and the wear and tear of frequent handling. Failure to withstand the above will be cause for rejection.

5. Photographic tracings shall be perfectly smooth and flat when unrolled and show no tendency to pucker or draw. The background of the cloth after printing and developing shall be of a bluish-white tint, having a transparency ratio of not less than 65, and the cloth shall retain as nearly as possible the flexibility of natural tracing cloth. Thickness over 0.0043 inch, stiffness or tackiness shall be cause for rejection.

6. All tracings from which photographic tracings are made shall be in such condition as to produce photographic tracings which are satisfactory in every respect.

SI-1-c. Sizes of drawings.

1. The standard vertical dimension when reading all drawings except types A and C and radio drawings shall be 27 inches, and the standard length shall be 40 inches, and this standard sheet shall be used wherever practicable. A half size sheet shall be 27 inches in the vertical direction and 20 inches in length, and this size sheet may be used when the standard sheet is not required. If a sheet larger than the standard sheet is essential, the length may be increased as required up to a maximum length of 80 inches. In exceptional cases the vertical dimension may be increased to 40 inches when specifically authorized by the Bureau. For deck arrangements of large vessels and similar plans, where the scale of drawings required to keep within the dimensions of the sheets specified herein, would make the drawing difficult to read, the inspector of machinery may permit the contractor to exceed the length of 80 inches specified, but the number of such sheets shall be kept at a minimum and specific approval of the inspector must be obtained in each instance.

2. Types B and D plans for radio apparatus shall conform to the following sizes:

- (a) "A" sheets, 10½ by 8½ inches.
- (b) "AA" sheets, 10½ by 16½ inches.
- (c) "F" sheets, 21 by 27 inches.
- (d) "J" sheets, 42 by 27 inches.

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3. There is no restriction as to the size of types A and C drawings.

S1-1-d. Type A drawings.

1. Type A drawings submitted in connection with bids for the building of vessels shall consist of such sketches and plans as may be necessary to amplify the Bureau's original contract plans. Such drawings shall be submitted in duplicate with bids or as required by the invitation for bids.

2. When equipment for vessels is to be purchased directly by the Navy Department, type A drawings in duplicate shall be furnished with the bids, or as may be specifically called for in the schedule or requisitions. In any case one set shall be for the files of the Bureau of Engineering and the remainder filed as directed by the Bureau of Supplies and Accounts. Type A drawings shall consist of all sketches, cuts, drawings, etc., as may be necessary to show completely the character and design of the material or equipment it is proposed to furnish, and in amplification of the description and guarantees described in the wording of the bid.

3. For apparatus such as turbines, pumps, motors, generators, condensers, boilers, and similar units, sectional plans shall be furnished which show clearly the details of the design, the materials of which the units are to be built, the over-all dimensions, and the space required for operation and overhaul.

4. For equipment such as distilling plants, refrigerating plants, and similar installations a floor-plan arrangement shall be furnished showing the space occupied by the apparatus, the space required for operation and overhaul, and the units which make up the plant. Sectional plans of the principal units containing the information required in the preceding paragraph, and such other information as will permit a clear understanding of the plants and their operation shall also be furnished.

5. Award of contract in connection with which type A plans have been submitted does not carry approval of such type A plans as construction or manufacturing plans but they are subject to modification in the development of type B plans as demanded by the requirements of the specifications and terms of the contract.

S1-1-e. Type B drawings.

1. Type B drawings shall consist of preliminary diagrammatic and detail working plans of all machinery and equipment prepared in the development of the contract specifications and shall be submitted for approval via the Bureau's inspector with suitable letter of transmittal for each vessel covered, as soon after award of contract as possible and before work covered by such plans is commenced. Before detail working plans are submitted diagrammatic plans of general arrangement of main and auxiliary machinery, piping, light, power, and interior communication systems must be approved. These drawings shall be carefully checked in order to correct omissions, errors, deviations from form, and noncompliances with the specifications before submission for approval via the Bureau's inspector. When drawings in an unsatisfactory condition in this respect are forwarded in sufficient quantity to constitute a definite cause for delay, the Bureau's inspector shall report the circumstances to the Bureau together with such comment as the contractor may care to make.

2. Type B drawings shall be furnished on blueprints in triplicate where the equipment covered thereby is entirely under the cognizance of the Bureau of Engineering. If other bureaus are involved one additional copy shall be furnished for each of the other bureaus concerned. Of the copies furnished, two shall be retained by the inspector and the remainder shall be forwarded by him to the Bureau. Upon receipt of the Bureau's action, one of the copies retained by the inspector will be suitably endorsed by him indicating such action and returned to the contractor. Additional copies offered by the contractor will be similarly endorsed on request.

3. Where two or more vessels of the same class are under construction at the works of the same contractor, or where plans are developed by a central drafting room, type B drawings pertaining to equipment common to two or more vessels shall be submitted as for one vessel and the number of blueprints furnished shall be as directed by the Bureau. In such case drawings shall show name and designation of all vessels covered and letter of transmittal shall give the same information together with contract number of each vessel.

4. Type B drawings may be submitted as tracings accompanied by one blueprint for the files of the Bureau of Engineering and one for the files of any other bureau concerned. When so submitted contractor shall furnish the Bureau's inspector with one copy for his use, as soon as approved tracing is returned with Bureau's approval.

5. Where type B drawings are taken from tracings previously approved by the Bureau for other vessels, or are tracings made from approved drawings of other builders a note shall be made of Bureau number previously assigned, together with notation "Modified," if modification has been made. If a new drawing is prepared it shall bear a note indicating that it supersedes the previous drawing number.

6. Any alteration made in a type B drawing during the progress of work shall require procedure to obtain approval in the same manner as in the case of the original. Copies of the new or altered drawing, if approval is obtained, shall be supplied as in the case of the original. If alterations are thus authorized and no new drawing is made, the altered drawing shall carry a table of alterations serially numbered and arranged in a table giving date, nature of each alteration, and reference authority for change; such alteration tables shall indicate the

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character of the original design features which have been altered. The Bureau's inspector shall certify approved alterations as in the case of the original drawing.

7. Two blueprint copies on paper of all finally approved type "B" drawings shall be supplied by the contractor with each vessel delivered to take the place of type D drawings, if the complete set of type D drawings is not ready at time of delivery. One set of such blueprints showing the machinery and electrical installations as finally approved shall be delivered to the commanding officer of each vessel via the inspector of machinery, and the other set forwarded via the inspector to the commandant of each vessel's home navy yard.

8. In the purchase of equipment for vessels directly by the Navy Department, type B drawings shall be furnished for the Bureau's action prior to fabrication of any material, unless the contract specifically states otherwise. In such case the method of procedure shall be identical with that outlined above. The drawings shall likewise be forwarded in triplicate with additional copies for each of the other bureaus concerned, unless the contract states otherwise.

S1-1-f. Type C drawings.

1. Type C drawings shall consist of such drawings as are necessary to amplify information supplied to subcontractors with purchase orders, copies thereof being required by the Bureau inspectors in making inspection at the works of the subcontractors.

2. Such drawings may be copies of type B plans previously approved or any other form of drawing the contractor may desire to use. Copies of such drawings shall be furnished complete with each copy of the purchase order. All drawings shall be clearly marked to show either shipbuilder's order number or Navy contract number to facilitate identification. Purchase orders are required to be submitted to the Bureau's inspector in quadruplicate. The Bureau's inspector will supply the Bureau and other inspectors at the works of subcontractors with copies as necessary.

3. Purchase orders for steel castings or forgings shall always be accompanied by type C drawings.

S1-1-g. Type D drawings.

1. Type D drawings shall consist of accurate hand tracings in india ink or photographic tracings on tracing cloth for all finished work, and shall be sufficiently extensive in detail to enable parts of the machinery and electrical installation of a vessel to be duplicated without additional drawings, and shall contain sufficient information to permit any part to be readily identified in orders for replacement; for the latter purpose only, photographs mounted on standard size cloth back sheets with part numbers clearly marked thereon will be acceptable to amplify and simplify, but not to replace the regular assembly drawings. (Except as modified under par. S1-1-k.)

2. Assembly drawings shall show the name of all major parts of the apparatus or subassemblies which appear on other plans. All clearances affecting the assembling of detail parts shall be clearly indicated, together with any other information required for the proper adjustment of those parts. Any information, not otherwise furnished in instruction books, pertaining to the operation of the apparatus shall be indicated.

3. Where photographic tracings are supplied, reproductions made from the manufacturer's own shop tracings, will, in general, be acceptable. However, whether photographic tracings are made from shop drawing or otherwise, no finished drawings supplied under these specifications shall show any plan or supply any information that is not strictly applicable to the apparatus or equipment for which the drawings are furnished except for certain classes of equipment which are made up of parts or subassemblies, the details of which can be indicated by the procedure specified in subparagraph S1-1-a-9.

4. For equipment which is required to be in accordance with Navy Department Specifications 17C10, 17G7, 17M9, and 17M10, the plans shall conform to the requirements specified therein, except that for type D plans, the number of sets, size, arrangements, title, and form shall conform to the requirements specified herein.

5. When a contractor for a given class of equipment is in doubt as to the character of the type D drawings required by the Bureau, it is suggested that a representative set of drawings covering a characteristic item of equipment be submitted to the Bureau in triplicate for approval. The Bureau will then retain one set of such drawings, and return one corrected set to the contractor, and send one corrected set to the Bureau's inspector having cognizance, for use in checking drawings delivered on contract.

6. All type D drawings shall be furnished complete within 4 months after a vessel has been delivered by the contractor unless the contract specifically states otherwise.

7. Where two or more vessels of the same design are under construction at the same time by the same contractor, original finished tracings or photographic tracings for the Bureau and for distribution to navy yards are required only as for one vessel, wherever the apparatus covered is identical. If not identical, separate and complete sets of tracings or photographic tracings for the Bureau and for navy yards for all items which differ shall be furnished for each vessel so affected. When more than one vessel is covered by a drawing, the designation, name, and contract number for each vessel to which the drawing applies shall appear thereon.

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8. Unless otherwise specified, sets of type D drawings shall be furnished in number and for the purpose indicated as follows:

- (a) One complete set of hand tracings or photographic tracings for each vessel or group of similar vessels on order from the same contractor for the files of the Bureau.
- (b) Seven complete sets as in (a) above to the Bureau's inspector for distribution to navy yards, as directed by the Bureau.
- (c) One complete set of blueprints for each vessel built containing only the items pertaining to that vessel; this set shall be supplied to the vessel via the inspector of machinery.

9. The type D drawings furnished for the machinery installation and electrical plant shall be indexed by the shipbuilder. Indexing shall be done with india ink and conform to size and style shown on Bureau of Engineering plan 50-R-87. The index number shall correspond to the official designation of the vessel, the group number shall conform to the Navy Filing Manual, and the file number shall conform to the master index sheets for machinery and electrical plans. Where a set of plans applies to a group of two or more vessels, all plans shall be indexed under the lowest numbered vessel of the group; in special cases where plans do not apply to all vessels of the group, such plans shall be indexed under the lowest numbered vessel of that group, and a notation made in or near the title to designate the vessel or vessels to which the plans are applicable. Type D drawings of radio apparatus shall be indexed by the shipbuilder in accordance with instructions furnished by the Bureau on request.

10. The Bureau will supply a set of blank index forms for type D drawings which will be filled in by the shipbuilder with india ink, after which the shipbuilder will make blue-line print copies of these forms for each set of plans; the indexed forms will be forwarded to the Bureau with the set of type D drawings intended for the Bureau's files, and set of blue-line copies will accompany each other set of these drawings.

11. Each set shall be wrapped in a waterproof wrapper and be packed separately, ready for shipment; in flat, strong, wooden cases, in which the sheets shall be so secured that it will be impossible for them to be displaced or crumpled during handling. Sets of machinery, electrical, and radio drawings for the same vessel may be boxed together.

12. In the purchase of equipment for vessels by direct contract with the Bureau, type D drawings conforming to the requirements of the above paragraphs shall be furnished by the contractor with the delivery of the completed material in number of sets as required by the contract.

13. No type D finished plans will be required for the interior communication equipment listed in subparagraph SI-1-h-6 (f).

SI-1-h. Instruction books and pamphlets.

1. Instruction books will be furnished by contractors and subcontractors for main propelling machinery, boilers, air compressors, forced draft blowers, reciprocating pumps, centrifugal pumps as required by Subsection S47-2, positive displacement rotary pumps as required by Subsection S47-3 and other auxiliary machinery, electrical installations and other important naval equipment furnished by them. These instruction books will contain all necessary pertinent information to insure efficient and economical use of the equipment, such data and information as may be required by the applicable specifications under which furnished, and in general, the following:

- (a) General description, including also sufficient sketches, illustrations, and sectional assemblies with appropriate references to drawing numbers and titles.
- (b) Installation instructions.
- (c) Operating instructions.
- (d) Instructions for care and maintenance.
- (e) Safety precautions.
- (f) Index.
- (g) For interior communication equipment listed in subparagraph SI-1-h-6 (f) reproductions of approved type B plans.

The books will be printed on a strong grade of paper using a medium size type so as to render easy reading. The size of the printed page shall be approximately 8½ by 10½ inches.

2. The instruction books shall be covered with a strong durable cover of black leather, leatherette, fabrikoid or similar approved material and shall be bound securely so as to prevent detachment of either the covering or the pages. The size of the cover shall be approximately 9 by 11 inches. The front cover shall contain the following information:

- (a) Sufficient descriptive data to enable ready identification.
- (b) Name and number of all vessels to which the equipment applies.

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(c) Contract numbers under which equipment was purchased. If more than one contract number is shown, the vessels supplied under each contract shall be indicated.

(d) Manufacturer's name and address.

A sample of the complete book shall be submitted to the Bureau for approval before final printing.

3. A contractor furnishing more than one set or type of equipment, subject to Bureau approval, may incorporate the instruction books of similar or allied equipment in one binder, providing the binder does not become bulky and more difficult to use.

4. The Bureau will consider requests by contractors in special cases to furnish descriptive pamphlets instead of instruction books. Such pamphlets shall contain sufficient information to insure that the operating personnel can operate and maintain the equipment properly. The pamphlets shall be bound in a durable cover as described in subparagraph S1-1-h-2 above.

5. All copies of instruction books required shall be delivered to the inspector of machinery prior to the delivery of each vessel. Sufficient copies shall be supplied for distribution by the inspector of machinery as follows:

- (a) Five to the Bureau of Engineering.
- (b) Ten to the commanding officer of each vessel, in the case of battleships, cruisers, and aircraft carriers, and five for each other type of vessel.
- (c) Two to the Superintendent of the United States Naval Academy.
- (d) Six books relating only to submarine equipment to the commander, submarine base, New London, Conn., for the submarine school.
- (e) In the case of vessels built at navy yards additional books shall be furnished as follows:
 - (1) Two for the Commandant, Navy Yard, Brooklyn, N. Y.
 - (2) Three for each building yard.
- (f) Two of equipment listed in subparagraph S1-1-h-6 (2) to each navy yard.

6. Instruction books shall in all cases be furnished for the following types of equipment wherever installed:

- (a) Electrical propulsion equipments for all classes of vessels.
- (b) Oil engines of all types, whether for propulsion purposes or not.
- (c) Gasoline engines of all types.
- (d) Main propulsion turbines.
- (e) All turbines for driving electric generators.
- (f) Propulsion reduction gears.
- (g) Oil-burning equipment.
- (h) Distilling plants.
- (i) Refrigerating plants and boxes.
- (j) Storage batteries, submarine propulsion.
- (k) All auxiliary machinery of new or unusual design.
- (l) Interior communication equipment:
 - (1) Electric clocks.
 - (2) Telegraph systems.
 - (3) Battery powered telephones.
 - (4) Sound-powered telephones.
 - (5) General announcing system.
 - (6) Electric log.
 - (7) Shaft-revolution indicator system.
 - (8) Fire-alarm system.
 - (9) Salinity indicator system.
 - (10) Automatic telephone system.
 - (11) Sound motion picture system.
 - (12) Wind direction and intensity system.
 - (13) High powered announcing system.

S1-1-i. Record of electrical installation.

1. Complete information and illustrative matter in connection with the details, layout, test, and operation of all the electrical equipment of a vessel shall be compiled by the contractor and bound by him into a convenient record of the electrical installation; information concerning radio equipment, and the underwater sound system shall not be included, except items connected with the power supply therefor, such as motor generators, etc. Arrangements to include information concerning items of the electrical installation not under the cognizance of

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the Bureau of Engineering shall be made by the contractor with the assistance and to the satisfaction of the inspector of machinery.

2. In general, the material included shall contain full information in regard to general appearance, details of construction, operation, connections, maintenance, shop test data, and shipboard test data (for standard test forms for electrical tests, see appendix I) of all electrical machinery, instruments, fittings, appliances, etc., except such as may be covered by Bureau standard plans and those excepted by subparagraph SI-1-k-1. For illustrative purposes, blueprints, photographs, cuts, or other suitable reproductions may be used and these shall be properly numbered or lettered to accompany the text; scales shall not be reduced to a size which would render reproductions difficult to read. Every type of instrument employed in the interior communication and signal systems, as well as generators, motors, controllers, searchlights, rheostats, circuit breakers, storage batteries, switchboards, panels, switchboard instruments, etc., shall be included, with the manufacturer's instructions, testing methods, nomenclature, catalog designation, and ordering instructions therefor. Elementary wiring diagrams shall be included in conjunction with other description and test data for electrical installations. Descriptions and plans of items furnished by the Government shall be obtained from the Bureau concerned by the contractor and included in the final compilation.

3. All matter as finally compiled shall be grouped and carefully indexed; the grouping shall be on general lines, as, for example: (a) General, (b) distribution, (c) power, (d) lighting, (e) interior communication, (f) signals, (g) storage batteries, etc. The text may be printed or multigraphed and extracts from manufacturer's catalog covering the apparatus concerned may be bound directly in the record if of convenient size.

4. Fourteen copies of the record shall be prepared and all copies shall be delivered to the inspector of machinery prior to the delivery of each vessel for distribution as follows:

- (a) Five copies to the Bureau of Engineering.
- (b) Five copies to the commanding officer of each vessel.
- (c) One copy to the Bureau of Construction and Repair.
- (d) Two copies to the Bureau of Ordnance.
- (e) One copy to the Bureau of Navigation.

5. Any original tracings or extra copies of subject matter specially prepared for the record by the contractor, shall be finally forwarded to the Bureau of Engineering.

6. Every precaution should be observed to see that none of the information compiled in the record falls into the hands of unauthorized persons; see note at the beginning of subsection.

SI-1-j. Booklet plans of machinery.

1. Information and drawings of the systems hereinafter enumerated shall be prepared by the contractor, and blueprint copies of same shall be bound in suitable paper-backed booklets by him and delivered to the inspector of machinery prior to the delivery of each vessel. Sufficient copies shall be prepared for distribution by the inspector of machinery as follows:

- (a) One to the Bureau of Engineering.
- (b) Ten to the commanding officer of each vessel in the case of battleships, cruisers, and aircraft carriers and five for each other type of vessel.
- (c) One to each navy yard.
- (d) Two to the Superintendent of the United States Naval Academy.

2. After all copies have been made the original tracings prepared for the booklets shall be forwarded to the Bureau for its files.

3. Drawings for the booklet plans of machinery shall be submitted to the Bureau for approval before final tracings. The final form of the drawings supplied shall be as finished tracings on cloth, in sheets 14 by 34 inches with a 1/2-inch margin all around, except on the left edge where a margin of 1 1/4 inches shall be left for binding. No more than one system shall be shown on any sheet, and each system shall be complete. All valves, branches, and connections to main and auxiliary machinery and equipment shall be shown.

4. Drawings shall be clear and distinct and shall show leads of all piping connections and in skeleton diagrammatic arrangement. Copy of Bureau's standard drawing may be requested as indicative of what is required. (See Bureau type plan 6-Y-374.) At least one tracing showing each of the following systems and connections as installed in plan, and one showing each as installed in elevation shall be furnished. Certain systems may be shown for each deck if desirable.

For all vessels, except submarines:

- (a) Main and auxiliary steam piping.
- (b) Boiler feed; suction, discharge, and make-up feed piping.

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- (c) Auxiliary exhaust piping.
- (d) Fresh-water tanks; filling and suction piping.
- (e) Fire and bilge; suction and discharge piping.
- (f) Distilling plant; all piping.
- (g) Refrigerating plant; refrigerant, brine, and water piping.
- (h) Steam heating plant; steam and drain piping.
- (i) Pantry, galley, laundry, and bath; fresh-water supply; steam and drain piping.
- (j) Low-pressure steam drainage; piping and traps.
- (k) High-pressure steam drainage; piping and traps.
- (l) Main turbine glands, steam supply, leak-off piping, and steam-leakage-recovery system.
- (m) Main propelling machinery; lubricating oil supply return and purification system.
- (n) Lubricating oil tanks; filling and suction piping.
- (o) Sea valves; suction and discharge connections.
- (p) Compressed air; deck and machinery supply system.
- (q) Fuel oil; tank filling and suction piping.
- (r) Fuel oil; tank heating system, complete.
- (s) Fuel oil; burner supply piping to boilers, galley incinerator, and other special services.
- (t) Electric cable, electric-propulsion arrangement; generators via control station to motors, excitation, and control systems.
- (u) Electric-propulsion switching system.
- (v) Ventilation piping; supply and exhaust for machinery spaces.
- (w) Such other additional systems as the Bureau may specify in the individual case.

Note.—For destroyers and other small types of vessels where any of the above enumerated systems are not extensive, two or more can be combined and shown on the same sheet if convenient.

5. For heavy-oil engine installations (submarines), items (d), (f), (g), (h), (i), (n), (o), (q), (s), (t), and (u) shall be furnished as given in the foregoing subparagraph and the following additional items:

- (a) Forced lubrication and piston cooling; supply, return, and purification system.
- (b) Compressed air; scavenging, supercharging, and starting system.
- (c) Compressed air; ship's high-pressure system.
- (d) Compressed air; ship's low-pressure system.
- (e) Automatic fuel compensating system.
- (f) Main and auxiliary water systems.

6. In addition to the foregoing plans, general data for all vessels shall be supplied made up on a similar tracing, and a general synopsis of the official contract trials. The latter will be furnished to the contractor by the Bureau, via the inspector of machinery. The general data required shall include the following items, covering dimensions and outstanding characteristics:

- (a) Hull.
- (b) Propelling machinery.
- (c) Shafting and bearings.
- (d) Propellers.
- (e) Boilers.
- (f) Pumps.
- (g) Auxiliary machinery.
- (h) Condensers and vacuum equipment.
- (i) Lubricating oil capacity and storage.
- (j) Fuel capacity and storage.
- (k) Fresh-water capacity and storage.
- (l) Speeds and performance characteristics on official trials.

SI-1-k. TYPE B AND D DRAWINGS—LIST OF PLANS

1. In order to obtain uniformity in the preparation of type B, and particularly type D, drawings, the following lists of subject items for such drawings are given. For certain vessels some items listed do not apply; for others, necessary items may have been omitted. The lists are not intended to be exhaustive but are furnished only as a general guide; omission of any important item shall not be construed to relieve the contractor of the responsibility for furnishing either type B or type D drawings, pertaining to same if required. It is understood that these items are meant to include only work which is under the cognizance of the Bureau of Engineering.

2. For the following items, arrangement or assembly drawings will be required with such detail drawings or information as are necessary for a clear understanding of the item and to permit reproduction of parts which are

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subject to wear or breakage and which may require replacement. The details of parts may be made on the same sheet as the arrangement or assembly plan, may be in the form of a descriptive note, or may be on one or more separate sheets.

- (a) Bilge drainage system, machinery spaces.
 - (b) Blacksmith shop.
 - (c) Feed regulators.
 - (d) Fire extinguishers, machinery spaces (steam).
 - (e) Floor plates, machinery space.
 - (f) Forced-draft system.
 - (g) Foundations, important machinery.
 - (h) Foundry.
 - (i) Gear, locking, main and bilge injection, distance, valve operating.
 - (j) General workshop.
 - (k) Gratings, machinery spaces.
 - (l) Guards, main propulsion units.
 - (m) Heating system:
 - (1) Steam, living spaces.
 - (2) Coils, fuel-oil tanks.
 - (n) Indicators:
 - (1) Temperature.
 - (2) Fuel-oil tank gage.
 - (3) Smoke.
 - (o) Ladders, machinery spaces.
 - (p) Lagging and heat insulation.
 - (q) Oil purification apparatus.
 - (r) Piping.
 - (s) Protective devices, electric propulsion controls.
 - (t) Shop arrangements.
 - (u) Sirens, steam.
 - (v) Smoke pipes.
 - (w) Switching structure, electric propulsion control.
 - (x) Tanks, air.
 - (y) Trial equipment.
 - (z) Uptakes, boiler.
 - (aa) Valves:
 - (1) Sentinel.
 - (2) Sluice, gate.
 - (bb) Ventilating system, machinery spaces.
 - (cc) Whistles, steam and electric.
3. For the following items, assembly and complete detail plans will be required:
- (a) Air accumulators:
 - (1) Compressors.
 - (2) Ejecting apparatus for condensers.
 - (3) Flasks and plugs, Diesel engines.
 - (4) Starting and reversing gears, Diesel engines.
 - (b) Augmenters, vacuum.
 - (c) Bearings:
 - (1) Main shafting.
 - (2) Main thrust.
 - (3) Turbine thrust.
 - (d) Blowers:
 - (1) Ventilating, electric propulsion equipment.
 - (2) Forced draft, fire rooms.
 - (3) Soot.
 - (e) Boilers:
 - (1) Auxiliary.
 - (2) Main.
 - (f) Bolts, holding down, main propulsion units.

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- (g) Cables, electric-propulsion units.
- (h) Circuit breakers.
- (i) Clocks, electrical.
- (j) Clutch gear, main propulsion.
- (k) Condensers.
- (l) Coolers.
 - (1) Air.
 - (2) Oil.
 - (3) Water.
- (m) Distilling plant and auxiliary equipment.
- (n) Eductors.
- (o) Engines, main propelling.
- (p) Expansion couplings, shaft.
- (q) Expansion joints for piping.
- (r) Fair-waters.
- (s) Filters, lubricating oil.
- (t) Gages:
 - (1) Bridge.
 - (2) Turbine clearance.
- (u) Gear, lifting:
 - (1) Lifting, for important machinery.
 - (2) Operating:
 - (a) Main engines.
 - (b) Smoke pipe.
 - (c) Damper.
 - (d) Valve.
 - (3) Turning or jacking, main propulsion units.
- (v) Generators, main propelling.
- (w) Governors:
 - (1) Auxiliary units.
 - (2) Main propulsion units.
- (x) Grease extractors.
- (y) Heaters:
 - (1) Water.
 - (2) Oil.
- (z) Indicator gear:
 - (1) Auxiliary units.
 - (2) Main engines.
- (aa) Indicators:
 - (1) Revolution.
 - (2) Salinity.
- (bb) Insulators, electric propulsion cable.
- (cc) Interlocks, electric propulsion.
- (dd) Lubrication:
 - (1) Auxiliary units.
 - (2) Main propulsion units.
- (ee) Mandrels for white metal, main bearings.
- (ff) Manifolds and all important piping.
- (gg) Meters, torsion.
- (hh) Micrometer gear, main propulsion units.
- (ii) Motors, electric propulsion.
- (jj) Mufflers, exhaust, Diesel engines.
- (kk) Oil fuel system.
- (ll) Packing:
 - (1) Gland:
 - (a) Auxiliary turbine.
 - (b) Main turbines.
 - (2) Metallic, main engines.

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- (mm) Potheads, propulsion cables.
- (nn) Propellers
- (oo) Pumps
- (pp) Reduction gear, main propulsion units.
- (qq) Refrigerating plant.
- (rr) Relays, electric propulsion control.
- (ss) Rheostats, electric propulsion control.
- (tt) Separators:
 - (1) Oil.
 - (2) Steam.
- (uu) Shafting, main propulsion.
- (vv) Strainers:
 - (1) Macomb.
 - (2) Oil.
 - (3) Steam.
- (ww) Stuffing boxes:
 - (1) Bulkhead.
 - (a) Pipe.
 - (b) Shaft.
 - (2) Main engine.
 - (3) Stern tube.
- (xx) Switchboards, electric propulsion control.
- (yy) Switches, electric propulsion control.
- (zz) Tanks:
 - (1) Air.
 - (2) Feed and filter.
 - (3) Ice making.
 - (4) Oil.
- (aaa) Tools, special.
- (bbb) Transformers, electric propulsion.
- (ccc) Turbine, special control, main propulsion units.
- (ddd) Turbines:
 - (1) Auxiliary.
 - (2) Main propulsion.
- (eee) Valves:
 - (1) Boiler blow.
 - (2) Check.
 - (3) Feed stop and check.
 - (4) Composition gate above 2½ inches (where not standard).
 - (5) Composition globe, angle and cross above 2½ inches (where not standard).
 - (6) Injection.
 - (7) Reducing or regulating.
 - (8) Relief.
 - (9) Safety, boiler.
 - (10) Sea.
 - (11) Spring-loaded or pressure-regulating, exhaust.
 - (12) Stop, boiler.
 - (13) Throttle.
 - (14) Toggle operated stop and cut out valves in the main steam lines.

4. For certain classes of equipment, such as those where mechanical fit is not an object, where it may be manifestly impracticable for the manufacture of replacement parts to be attempted by naval personnel, or where the item in question is in accordance with approved naval standards or so standardized industrially as to be readily obtainable by purchase in practically any United States port, types B and D drawings in the form specified above will not be required. In lieu of hand tracings or photographic tracings, however, sufficient information shall be supplied by photographs, illustrations, printed matter, etc., to enable the equipment in question to be readily understood and to permit all parts to be ordered for replacement. The following list of items is given as indicative of equipment covered in this subparagraph:

- (a) Bolt forcers.

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- (b) Calorimeters.
 - (c) Chain blocks.
 - (d) Cleaners, tube
 - (e) Clocks, nonelectrical.
 - (f) Counters, revolution.
 - (g) Electrical metering instruments, switchboard and portable.
 - (h) Flue-gas analyzing outfits.
 - (i) Fuses.
 - (j) Gages (steam, vacuum, air, water, and oil) except special types.
 - (k) Indicators:
 - (1) Diesel engine.
 - (2) Steam engine.
 - (l) Instruments, electric propulsion.
 - (m) Joints, universal.
 - (n) Machine tools (except motors and other electrical equipment).
 - (o) Meters:
 - (1) Oil
 - (2) Water.
 - (p) Pipe fittings.
 - (q) Pyrometers.
 - (r) Springs.
 - (s) Thermometers.
 - (t) Transformers, instruments
 - (u) Tools
 - (1) Hand (except special wrenches, etc.).
 - (2) Machine (except motors and other electrical equipment).
 - (3) Workshop.
 - (v) Traps, except vacuum traps for turbine drainage.
 - (w) Valves:
 - (1) Made from Bureau standard plans, Navy Department specifications, or Supplementary General Specifications, except toggle operated stop and out-out valves in main steam line.
 - (2) Composition gate, globe, angle and cross, 2 1/4 inches and under.
5. The following items for plans of electrical installation of vessels are listed to be furnished by the contractor:
- (a) *Power system:*
 - (1) Elementary diagram of power distribution system (refer to type and contract plans. See also subpar. S1-1-k-5 (e) (1)).
 - (2) Electrical data for motor driven auxiliaries (standard form, Bureau drawing 9-S-4729-L).
 - (3) Power analysis and summary of feeders (standard form for A. C. Bureau drawing 9-S-4704-L. See also subpar. S1-1-k-5 (g) (5)).
 - (4) Isometric wiring diagram of *Battle* and *General* systems.
 - (5) Isometric wiring diagram of *Emergency* system (including portable storage battery leads and charging circuits).
 - (6) Isometric wiring diagram of bus ties, switchboard interconnections, generator cables, shore connections, transformers and feeders for ships alongside (tender class), etc.
 - (7) Elementary diagram of vent sets power and control, and vent system closures and control.
 - (8) Elementary diagram of electric furnace power and control.
 - (9) Elementary diagram of all systems of remote control of circuits.
 - (10) Elementary diagram of control and starting circuits of emergency generator starting.
 - (11) Isometric diagram of heating, starting, and radio testing installations.
 - (12) Elementary of control, interlock and indicating connections between switchboards.
 - (13) Isometric wiring diagram of power circuits in gun turrets and mounts.
 - (14) Isometric wiring diagram of cable leads for main propulsion (also an elementary wiring diagram).
 - (15) Working wiring deck plans.
 - (16) List of feeders and mains of *Battle*, *General*, and *Emergency* systems (standard form Bureau drawing 9-S-4746-L).

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- (17) List showing switch arrangements, loads, fusing, etc., of distribution panels.
- (18) Summary list of all storage batteries on vessel showing charging arrangements.
- (19) Complete list of transformers with load data.
- (b) *Lighting system:*
 - (1) List of lighting fixtures and appliances with symbols (standard form, Bureau drawing 9-S-4905-L. See also subpar. S1-1-k-5 (b) (15)).
 - (2) Isometric wiring diagram of *Battle* and *General* systems.
 - (3) Isometric wiring diagram of *Emergency* system.
 - (4) Outline plan of vessel showing exact locations of all searchlights, running, anchor, and signal lights.
 - (5) Elementary wiring diagram of running, anchor, and signal lights.
 - (6) Isometric wiring diagram of running, anchor, and signal lights.
 - (7) Isometric wiring diagram of lighting circuits in gun turrets and mounts and torpedo mounts.
 - (8) Plan showing locations of all light deck lights.
 - (9) Elementary diagram of circuits of all light deck lights.
 - (10) Elementary diagram of control of all light deck lights.
 - (11) Elementary diagram of control of hangar deck lighting.
 - (12) Elementary diagram of remote control of general lighting.
 - (13) Working wiring deck plans.
 - (14) List of feeders and mains of *Battle*, *General*, and *Emergency* systems (standard form, Bureau drawing 9-S-4745-L).
 - (15) List showing switch arrangements, loads, fusing, etc., of distribution panels.
 - (16) Load, analysis and summary of feeders (standard form for A. C. Bureau drawing 9-S-4704-L. See also subpar. S1-1-k-5 (a) (3)).
 - (17) Summary of lighting system equipment (standard form, Bureau drawing 9-S-4905-L. See also subpar. S1-1-k-5 (b) (1)).
 - (18) Illumination survey data (standard form, Bureau drawing 9-S-4901-L).
- (c) *Interior-communication and fire-control systems:*
 - (1) Elementary wiring diagram of each interior-communication system. The Government will supply type B and type D plans of elementary wiring diagrams of self-synchronous fire-control circuits.
 - (2) Isometric wiring diagram of each interior-communication and fire-control system.
 - (3) List of voice-tube outlets.
 - (4) List of telephones (battle, sound powered, automatic, general announcing).
 - (5) Diagram of current supply.
 - (6) Load summary of all circuits emanating from interior-communication switchboards.
 - (7) Deck plans ($\frac{1}{4}$ -inch scale on surface ships, $\frac{1}{8}$ -inch scale on submarines); separate sets of plans for interior-communication and fire-control systems.
- (d) *General plans for all miscellaneous electrical systems and installations in the following spaces (these plans are in addition to those submitted as purely general arrangement plans for joint approval of the Bureau concerned):*
 - (1) *Wireways:*
 - (a) *Wireway deck plans.*—Composite for all systems—power lighting, I. C., F. C., radio, sound, steering gear selsyn, etc.—including thereon the following minimum information:
 - (1)' Location of runs.
 - (2)' Approximate space dimensions of runs.
 - (3)' Designation of methods of support used for each section of runs.
 - (4)' Designation of sections (and plan numbers for same) for which wireway details are shown on separate plans.
 - (5)' Cables in the runs—showing for each:
 - a' Circuit number.
 - b' Cable type and size.

These plans shall be developed in collaboration with the development of the machinery arrangement (and prior to fixing such arrangement), so as to insure compliance with all cable arrangement (including circuit trunking) and installation specification requirements, allotment of space, etc.

 - (b) *Wireway details.*—As necessary, including the following minimum information:
 - (1)' Arrangement (vertical) of cables in main wireway racks.

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- (2)' Arrangement in gun-director trunk.
- (3)' Arrangement at gun mounts.
- (4)' Wiring tunnels.
- (5)' Arrangements at important locations, such as engine and fireroom bulkheads, vicinity of main switchboards I. C. and F. C. switchboards, etc.

NOTE.—Detail data such as shop drilling data for stuffing tubes in decks and bulkheads, etc., are not required for type B and D plans.

The nature of these plans (wireway details) will not permit specific checking for complete approval by the Bureau, and therefore the local inspector of machinery will act on such plans, and by close follow up shall be responsible for designs and installation being in as full compliance as practicable with the requirements and intent of the applicable specifications. Also in this connection, regardless of whether shown on detail plans or not, departures from specifications (including standard installation methods) will be approved by the inspector of machinery upon installation only in instances where the installation is such that such departure is necessary. Copies of such plans given local approval shall be furnished for the information and files of the Bureau. Any particular matters in connection with these matters (wireway details) on which the Bureau's decision is considered necessary, shall be submitted with full particulars and recommendations.

- (2) *Dynamo flats.*—Diesel engine generator rooms—switchboard rooms—etc. (to show arrangements of generator sets, rheostats, voltage regulator units, switchboards).
- (3) Storage-battery compartment and arrangement of battery-charging station.
- (4) Arrangement of electrical workshop.
- (5) Steering-gear room.
- (6) Turrets and mounts.
- (7) Turret.
 - (a) Column and base.
 - (b) Castings.
- (8) Torpedo tubes.
- (9) Torpedo rooms.
- (10) Refrigerating plant spaces.
- (11) Machinery spaces.
- (12) Boiler rooms.
- (13) Motor rooms.
- (14) Bridge.
- (15) Central station.
- (16) Chart house.
- (17) Conning tower.
- (18) Armored access and wiring tubes.
- (19) Control rooms.
- (20) Maneuvering rooms.
- (21) Fire-control and director stations.
- (22) Gyro rooms.
- (23) Interior-communication room.
- (24) Cable installations at exposed guns and directors.
- (25) Masts.
- (26) Pilot house.
- (27) Plotting rooms.
- (28) Photographic laboratory.
- (c) *Miscellaneous.*
 - (1) Schedule of type B plans of electrical installation—This schedule shall consist of a tabulation of the plans required of the electrical installation of the vessel or vessels concerned; listing in parallel columns: (a) The titles; (b) the contractors plan numbers (with column for alteration numbers); (c) the Bureau of Engineering plan numbers (with column for alteration numbers; (d) the estimated date of submission for approval and (e) remarks; additional columns may be added to suit the contractors convenience.
 - (2) A plan listing all methods of supporting cables, fixtures, panels, appliances, etc., by Bureau plan, alteration, and method numbers as used; and delineating any proposed methods which